

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing: 21 October 1999 (21.10.99)	
International application No.: PCT/US97/12445	Applicant's or agent's file reference: CM1550F/JH
International filing date: 09 July 1997 (09.07.97)	Priority date:
Applicant: HERBOTS, Ivan, Maurice, Alfons, Jan et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International preliminary Examining Authority on:
04 January 1999 (04.01.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

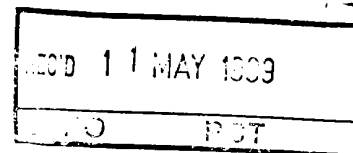
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer: J. Zahra Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference CM1550F/JH	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US97/12445	International filing date (day/month/year) 09/07/1997	Priority date (day/month/year) 09/07/1997
International Patent Classification (IPC) or national classification and IPC C11D3/386		
Applicant THE PROCTER & GAMBLE COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 04/01/1999	Date of completion of this report 07.05.99
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0 Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer Hillebrecht, D Telephone No. (+49-89) 2399 8168 



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US97/12445

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-100 as originally filed

Claims, No.:

1-26 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:

☐ the claims, Nos.:

☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-26
	No:	Claims	

Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-26

Industrial applicability (IA)	Yes:	Claims	1-26
	No:	Claims	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US97/12445

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US97/12445

Reference is made to the following documents:

D1: WO-A-96/06909

D2: WO-A-96/06532

- V.1. The present application complies with Article 33(2) PCT. D1 discloses compositions comprising components b), c), and d) of present claim 1. Compositions comprising a surfactant system a) are not explicitly disclosed.

D2 discloses basic protein compositions useful in detergent and hard surface cleaning compositions. The compositions comprise i.a. an oxidoreductase. However, there is no indication in D2 that an oxidoreductase with an α/β -hydrolase fold and a catalytic triad consisting of serine, histidine and aspartic acid are used.

2. The present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of claims 1, and 21 to 26 does not involve an inventive step (Rule 65(1) (2) PCT).

Document D1 discloses a bleach system comprising components b), c), and d) of present claim 1. Moreover, D1 suggests to use this system i.a. in sanitizing compositions, and in any type of cleaning compositions. It is thus obvious for the skilled worker to apply the system of D1 in cleaning compositions comprising a surfactant system or a softening compound. Applicants did not show any unexpected effect which goes beyond the teaching of D1 (cf. D1, page 1, lines 5 to 15, page 2, line 30 to page 3, line 3 and page 4, line 32 to page 5, line 13)

The subject-matter of the dependent claims appears also to be obvious in view of D1 or the general knowledge of the skilled artisan.

- VII. The unit of measure "Angstrom" employed on page 12 is not additionally expressed in terms of the units stipulated by Rule 10.1(a) PCT.

- VIII. Vague terms used throughout the entire specification like "about" when used in combination with ranges, and "etc." were not deleted (Article 5 PCT)



INTERNATIONAL COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference CM1550F/JH	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 97/ 12445	International filing date (day.month.year) 09/07/1997	(Earliest) Priority Date (day.month.year)
Applicant THE PROCTER & GAMBLE COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ **Certain claims were found unsearchable** (see Box I).
2. ☐ **Unity of invention is lacking** (see Box II).
3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
 - ☐ filed with the international application.
 - ☐ furnished by the applicant separately from the international application.
 - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
 - ☐ Transcribed by this Authority
4. With regard to the **title**, ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract**,
 - ☒ the text is approved as submitted by the applicant
 - ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.
6. The figure of the **drawings** to be published with the abstract is:
 - Figure No. ☐ as suggested by the applicant. ☐ None of the figures.
 - ☐ because the applicant failed to suggest a figure.
 - ☐ because this figure better characterizes the invention.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/12445

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C11D3/386 C11D3/20 C11D3/39

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C12N C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 96 06909 A (DEGUSSA AG.) 7 March 1996 cited in the application see the whole document ---	1, 3, 5, 6, 9-11, 22, 23, 26
Y	WO 96 06532 A (NOVO NORDISK A/S) 7 March 1996 see claims 1-21 see page 10, line 1 - page 11, line 8 ---	1, 3, 5, 6, 9-11, 22, 23, 26
A	WO 95 27046 A (UNILEVER NV.) 12 October 1995 cited in the application see claims 1-6 --- -/--	1, 10

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier document but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 "&" document member of the same patent family

Date of the actual completion of the international search

12 March 1998

Date of mailing of the international search report

25/03/1998

Name and mailing address of the ISA

European Patent Office P B 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel (+31-70) 340-2040, Tx 31 651 epo nl
 Fax: (+31-70) 340-3016

Authorized officer

Serbetsoglou, A

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/12445

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	EP 0 537 381 A (THE PROCTER & GAMBLE CO.) 21 April 1993 cited in the application see the whole document ---	1,10,11, 22
A	EP 0 355 228 A (TUKOVY PRUMYSL KONCERN) 28 February 1990 see claims; examples ---	1,11,22, 23
A	WO 96 10079 A (NOVO NORDISK A/S) 4 April 1996 see page 4, line 27 - page 8, line 3 see page 12, line 7 - page 23, line 23 see claims 1-27 -----	1,9-18, 20,22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/12445

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9606909 A	07-03-96	DE 4430327 C AU 3472495 A EP 0777718 A	09-05-96 22-03-96 11-06-97
WO 9606532 A	07-03-96	AU 3341995 A EP 0778733 A	22-03-96 18-06-97
WO 9527046 A	12-10-95	AU 2085995 A AU 2215495 A BR 9507226 A CA 2182966 A CN 1146782 A CZ 9602850 A EP 0753055 A HU 74967 A JP 9511396 T NL 9401048 A WO 9527009 A PL 316571 A SK 123096 A	23-10-95 23-10-95 09-09-97 12-10-95 02-04-97 15-10-97 15-01-97 28-03-97 18-11-97 01-11-95 12-10-95 20-01-97 04-06-97
EP 0537381 A	21-04-93	AU 664716 B AU 2760992 A CA 2120776 A CN 1073202 A CN 1075501 A CZ 9400905 A EP 0538228 A FI 941708 A HU 67487 A JP 7500136 T MX 9205878 A PL 171617 B PT 100955 A WO 9308324 A WO 9315174 A US 5574003 A	30-11-95 21-05-93 29-04-93 16-06-93 25-08-93 13-07-94 21-04-93 13-04-94 28-04-95 05-01-95 30-04-93 30-05-97 30-11-93 29-04-93 05-08-93 12-11-96
EP 0355228 A	28-02-90	CS 8603805 A JP 2069599 A	16-09-88 08-03-90

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/12445

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9610079 A	04-04-96	AU 3517695 A	19-04-96
/		EP 0781328 A	02-07-97
		FI 971262 A	26-03-97
<hr/>			

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
	<p>see the whole article (cited in the application)</p> <p>-----</p>	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9100863

SA 47048

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/09/91
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 3608093	17-09-87	EP-A- 0240727 JP-A- 62223375	14-10-87 01-10-87
DE-A- 2430140	19-02-76	None	
EP-A- 0284036	28-09-88	DE-A- 3710064 JP-A- 63290853	06-10-88 28-11-88
EP-A- 0239910	07-10-87	GB-A- 2188653 AU-B- 599966 AU-A- 7096587 JP-A- 63006168 US-A- 4767547	07-10-87 02-08-90 08-10-87 12-01-88 30-08-88
US-A-39158867		None	

I RNATIONALER RECHERCHENBERICHT

Internationales Patentabzeichen

PCT/EP 9100863

I. KLASSIFIKATION DES ANMELDUNGSGEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben)⁶

Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC
 C 07 C 219/08 C 11 D 1/62 D 06 M 13/463

II. RECHERCHIERTE SACHGEBIETE

Recherchierter Mindestprüfstoff⁷

Klassifikationssystem

Klassifikationssymbole

Int. Cl. 5

C 07 C 219/00

Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen⁸

III. EINSCHLAGIGE VERÖFFENTLICHUNGEN⁹Art.⁹Kennzeichnung der Veröffentlichung¹¹, soweit erforderlich unter Angabe der maßgeblichen Teile¹²Betr. Anspruch Nr.¹³

A	DE-A-3 608 093 (HENKEL) 17. September 1987, siehe das ganze Dokument ---	1-13
A	DE-A-2 430 140 (REWO CHEMISCHE FABRIK) 19. Februar 1976, siehe das ganze Dokument ---	1-13
A	EP-A-0 284 036 (HOECHST) 28. September 1988, siehe das ganze Dokument (in der Anmeldung erwähnt) ---	1-13
A	EP-A-0 239 910 (PROCTER & GAMBLE) 7. Oktober 1987, siehe Beispiele; Ansprüche (in der Anmeldung erwähnt) ---	1-13
A	US-A-39 158 867 (KANG et al.) 28. Oktober 1975, siehe Beispiele; Ansprüche (in der Anmeldung erwähnt) --- -/-	1-13

⁹ Besondere Kategorien von angegebenen Veröffentlichungen¹⁰:

- "A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist
- "E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist
- "L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)
- "O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht
- "P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist

"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist

"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden

"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist

"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

IV. BESCHEINIGUNG

Datum des Abschlusses der internationalen Recherche

19-07-1991

Absenddatum des internationalen Recherchenberichts

16.09.91

Internationale Recherchenbehörde

EUROPAISCHES PATENTAMT

Unterschrift des bevollmächtigten Bediensteten

Falk Heck



III. EINSCHLAGIGE VERÖFFENTLICHUNGEN (Fortsetzung von Blatt 2)

Art °	Kennzeichnung der Veröffentlichung, soweit erforderlich unter Angabe der maßgeblichen Teile	Betr. Anspruch Nr.
A	<p>Fette, Seifen und Anstrichmittel, Band 88, Oktober 1986, M. MÜNZING et al.: "Kinetik der Fetthärtung und Vergleich verschiedener Katalysatoren", Seiten 387-391, siehe den ganzen Artikel (in der Anmeldung erwähnt)</p> <p>-----</p>	1-13

ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.

EP 9100863
SA 47048

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben.
Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am 06/09/91
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
DE-A- 3608093	17-09-87	EP-A- 0240727 JP-A- 62223375	14-10-87 01-10-87
DE-A- 2430140	19-02-76	Keine	
EP-A- 0284036	28-09-88	DE-A- 3710064 JP-A- 63290853	06-10-88 28-11-88
EP-A- 0239910	07-10-87	GB-A- 2188653 AU-B- 599966 AU-A- 7096587 JP-A- 63006168 US-A- 4767547	07-10-87 02-08-90 08-10-87 12-01-88 30-08-88
US-A-39158867		Keine	

EPO FORM P0473



PCT
WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro
INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 5 : C07C 219/08, C11D 1/62 D06M 13/463	A1	(11) Internationale Veröffentlichungsnummer: WO 91/17974 (43) Internationales Veröffentlichungsdatum: 28. November 1991 (28.11.91)		
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="width: 50%; vertical-align: top;">(21) Internationales Aktenzeichen: PCT/EP91/00863 (22) Internationales Anmeldedatum: 8. Mai 1991 (08.05.91) (30) Prioritätsdaten: P 40 15 849.7 17. Mai 1990 (17.05.90) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN [DE/DE]; Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): UPHUES, Günter [DE/DE]; Robert-Koch-Straße 45, D-4019 Monheim (DE). PLOOG, Uwe [DE/DE]; Haydnweg 6, D-5657 Haan (DE). JESCHKE, Rainer [DE/DE]; Am Broichgraben 52, D-4000 Düsseldorf 13 (DE). WALTENBERGER, Peter [DE/DE]; Mühlenstraße 21, D-5461 Breitscheid-Hollig (DE).</td><td style="width: 50%; vertical-align: top;">(74) Gemeinsamer Vertreter: HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN; TFP-Patentabteilung, Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), BR, CA, CH (europäisches Patent), DE (europäisches Patent), DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), GR (europäisches Patent), IT (europäisches Patent), JP, KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), US. Veröffentlicht <i>Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist. Veröffentlichung wird wiederholt falls Änderungen eintreffen.</i></td></tr></table>			(21) Internationales Aktenzeichen: PCT/EP91/00863 (22) Internationales Anmeldedatum: 8. Mai 1991 (08.05.91) (30) Prioritätsdaten: P 40 15 849.7 17. Mai 1990 (17.05.90) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN [DE/DE]; Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): UPHUES, Günter [DE/DE]; Robert-Koch-Straße 45, D-4019 Monheim (DE). PLOOG, Uwe [DE/DE]; Haydnweg 6, D-5657 Haan (DE). JESCHKE, Rainer [DE/DE]; Am Broichgraben 52, D-4000 Düsseldorf 13 (DE). WALTENBERGER, Peter [DE/DE]; Mühlenstraße 21, D-5461 Breitscheid-Hollig (DE).	(74) Gemeinsamer Vertreter: HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN; TFP-Patentabteilung, Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), BR, CA, CH (europäisches Patent), DE (europäisches Patent), DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), GR (europäisches Patent), IT (europäisches Patent), JP, KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), US. Veröffentlicht <i>Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist. Veröffentlichung wird wiederholt falls Änderungen eintreffen.</i>
(21) Internationales Aktenzeichen: PCT/EP91/00863 (22) Internationales Anmeldedatum: 8. Mai 1991 (08.05.91) (30) Prioritätsdaten: P 40 15 849.7 17. Mai 1990 (17.05.90) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN [DE/DE]; Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): UPHUES, Günter [DE/DE]; Robert-Koch-Straße 45, D-4019 Monheim (DE). PLOOG, Uwe [DE/DE]; Haydnweg 6, D-5657 Haan (DE). JESCHKE, Rainer [DE/DE]; Am Broichgraben 52, D-4000 Düsseldorf 13 (DE). WALTENBERGER, Peter [DE/DE]; Mühlenstraße 21, D-5461 Breitscheid-Hollig (DE).	(74) Gemeinsamer Vertreter: HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN; TFP-Patentabteilung, Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), BR, CA, CH (europäisches Patent), DE (europäisches Patent), DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), GR (europäisches Patent), IT (europäisches Patent), JP, KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), US. Veröffentlicht <i>Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist. Veröffentlichung wird wiederholt falls Änderungen eintreffen.</i>			
(54) Title: QUATERNERISED ESTERS OBTAINED FROM ALKANOL AMINES WITH FATTY ACIDS AND THEIR USE AS REVIVING AGENT (54) Bezeichnung: QUATERNIERTE ESTER VON ALKANOLAMINEN MIT FETTSÄUREN UND VERWENDUNG ALS AVIVAGEMITTEL (57) Abstract <p>Quaternerised esters with textile softening and hydrophilising properties are obtained by the reaction of mono-unsaturated fatty acids containing at least 40 mol % trans-configured double bonds or their esters with alkanol amines followed by quaternisation of the reaction products with alkylising agents.</p> (57) Zusammenfassung <p>Durch Umsetzung von einfach ungesättigten Fettsäuren, die einen Gehalt von mindestens 40-Mol-% trans-konfigurierter Doppelbindungen aufweisen, oder deren Ester mit Alkanolaminen und nachfolgende Quaternierung der Reaktionsprodukte mit Alkylierungsmitteln werden quaternierte Ester erhalten, die textilweichmachende und hydrophilisierende Eigenschaften besitzen.</p>				

LEDIGLICH ZUR INFORMATION

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**QUATERNIERTE ESTER VON ALKANOLAMINEN MIT FETTSÄUREN
UND VERWENDUNG ALS AVIVAGEMITTEL**

Gegenstand der Erfindung sind quaternierte Ester, erhältlich durch Umsetzung von ungesättigten Fettsäuren, die einen Gehalt von mindestens 40 Mol-% trans-konfigurierter Doppelbindungen aufweisen, oder deren Ester mit Alkanolaminen und anschließende Quaternierung der Reaktionsprodukte mit Alkylierungsmitteln sowie die Verwendung der Produkte als Wäscheweichspülmittel.

Quaternierte Ester aus gesättigten Fettsäuren und Alkanolaminen finden in der Textilavivage als Weichmacher Verwendung [DE-A-16 19 058, DE-A-17 94 068]. Eine besondere Bedeutung kommt dabei Produkten zu, die durch Umsetzung von 2 Mol gesättigter Fettsäure mit 1 Mol Triethanolamin und nachfolgende Quaternierung mit Dimethylsulfat oder Methylchlorid erhältlich sind. Textilien, die mit quaternierten Estern dieser Art behandelt wurden, verfügen zwar über einen guten Weichgriff, sie weisen jedoch häufig eine unerwünschte Hydrophobie auf, die sich in einer schlechten Benetzbarkeit oder Wasseraufnahme der behandelten Gewebe äußert.

In der Vergangenheit hat es nicht an Versuchen gemangelt, dieses Problem zu lösen.

Aus der amerikanischen Patentschrift US 39 15 867 ist z. B. bekannt, daß quaternierte Ester von Mischungen gesättigter und ungesättigter Fettsäuren, wie sie z. B. auf einfachem Wege durch

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Spaltung natürlicher Fette und Öle zugänglich sind, mit Triethanolamin ein gutes Avivagevermögen besitzen. In der Patentschrift wird ferner offenbart, daß quaternierte Ester auf Basis von ungesättigten Fettsäuren und Alkanolaminen über keinerlei textilweichmachende Eigenschaften verfügen. Gemische quaternierter Ester auf Basis von gesättigten und ungesättigten Fettsäuren weisen demnach schlechtere anwendungstechnische Eigenschaften als quaternierte Ester auf, zu deren Herstellung ausschließlich gesättigte Fettsäuren verwendet werden.

Quaternierte Triethanolamin-triester auf Basis gesättigter oder einfach ungesättigter Fettsäuren mit 12 bis 22 Kohlenstoffatomen sind aus der europäischen Patentanmeldung EP-A-0 239 910 bekannt. Produkte dieser Art, die über drei lange Fettsäurereste und eine kurzkettige Alkylgruppe verfügen, zeigen jedoch unbefriedigende avivierende Eigenschaften.

Gemäß der Lehre der europäischen Patentanmeldung EP-A-0 284 036 lassen sich schließlich technische Gemische von Estern gesättigter und ungesättigter Fettsäuren mit Glycerin, wie sie z. B. auf Basis von natürlichen Fetten und Ölen zugänglich sind, mit Alkanolaminen umestern und anschließend quaternieren. Da quaternierte Ester dieser Art wiederum ungesättigte Anteile enthalten, erweisen sie sich gesättigten Produkten im Hinblick auf den Weichgriff unterlegen.

Aufgabe der Erfindung war es somit, quaternierte Ester von Fettsäuren mit Alkanolaminen zu entwickeln, die in der Lage sind, Textilien sowohl einen guten Weichgriff, als auch eine hohe Hydrophilie zu vermitteln.

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Gegenstand der Erfindung sind quarternierte Ester, erhältlich durch

- A) Umsetzung von einfach ungesättigten Fettsäuren mit 16 bis 22 Kohlenstoffatomen und einem Gehalt von mindestens 40 Mol-% trans-konfigurierter Doppelbindungen oder deren Ester mit Glycerin oder aliphatischen Alkoholen mit 1 bis 4 Kohlenstoffatomen

mit Alkanolaminen der Formel (I),



in der R¹ und R² unabhängig voneinander Hydroxyalkylreste mit 2 bis 4 Kohlenstoffatomen darstellen und R³ für R¹ oder einen linearen oder verzweigten Alkylrest mit 1 bis 22 Kohlenstoffatomen steht und

- B) anschließende Quaternierung der Reaktionsprodukte mit Alkylierungsmitteln.

Die Erfindung beruht auf der Erkenntnis, daß quaternierte Ester von Fettsäuren, die zu mindestens 40 Mol-% mit trans-konfigurierten Doppelbindungen vorliegen, mit Alkanolaminen Textilien bei der avivierenden Behandlung einen überraschend guten Weichgriff vermitteln und darüberhinaus weniger hydrophobierend wirken.

Als Fettsäuren für die Herstellung der erfindungsgemäßen quaternierten Ester kommen insbesondere die Elaidinsäure sowie elaidinsäurereiche technische Fettsäurefraktionen in Betracht, die einen

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Gehalt an Fettsäuren mit trans-konfigurierten Doppelbindungen von mindestens 40 Mol-% aufweisen.

Als Ausgangsmaterial für die Herstellung der quaternierten Ester kommen weiterhin Ester der vorgenannten Fettsäuren mit Alkoholen mit 1 bis 4 Kohlenstoffatomen in Betracht. Typische Beispiele sind Ethyl-, n-Propyl-, i-Propyl-, n-Butyl- oder insbesondere Methyl-ester. In einer besonderen Ausführungsform der Erfindung können die Fettsäuren ferner als Voll- oder Partialester des Glycerins vorliegen.

Zur Herstellung der ungesättigten Fettsäuren mit einem Gehalt an trans-konfigurierten Doppelbindungen von mindestens 40 Mol-% oder deren Ester kann man von Linolsäure oder deren Estern ausgehen, die in Gegenwart von modifizierten Nickel-Katalysatoren selektiv zu Gemischen einfach ungesättigter Fettsäuren mit hohem Elaidinsäuregehalt ("trans-Gehalt") oder deren Ester hydriert werden. Eine andere Möglichkeit besteht darin, cis-Octadecensäure (Ölsäure) oder deren Ester in Gegenwart von Selen oder Salpetersäure zur trans-Octadecensäure (Elaidinsäure) oder deren Ester zu isomerisieren. Derartige Verfahren zur Herstellung von Elaidinsäure und Elaidinsäureester sind seit langem bekannt und z. B. in Fette, Seif., Anstrichmitt., 88, 387 (1987) oder J.Am.Chem.Soc., 79, 4765 (1967) beschrieben.

Wie in der Fettchemie üblich, können zur Herstellung der ungesättigten Fettsäuren mit einem Gehalt an trans-konfigurierten Doppelbindungen von mindestens 40 Mol-% oder deren Ester auch technische Gemische von Fettsäuren oder deren Ester eingesetzt werden, die auf Basis natürlicher Fette und Öle erhalten werden. In diesem Fall wird der trans-Gehalt von den in den technischen Gemischen

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enthaltenen gesättigten Anteilen begrenzt. Vorzugsweise geht man daher von Produkten aus, die einen hohen Gehalt an Linol- oder Ölsäure und einen geringen Anteil gesättigter Verbindungen aufweisen, wie z. B. Sonnenblumenöl oder Rüböl.

Quaternierte Ester mit besonders guten anwendungstechnischen Eigenschaften werden erhalten, wenn man technische Elaidinsäuregemische mit einem Gehalt von mindestens 40 Mol-%, vorzugsweise mindestens 50 Mol-%, insbesondere mehr als 60 Mol-% Elaidinsäure, mit Alkanolaminen der Formel (I) umsetzt und die Reaktionsprodukte anschließend mit Alkylierungsmitteln quaterniert.

Als Alkanolamine kommen Di- und Trialkanolamine sowie deren Gemische in Betracht. Typische Beispiele sind Methyldiethanolamin, Ethyldiethanolamin, Kokosalkyldiethanolamin, Methyldiisopropanolamin oder Triethanolamin.

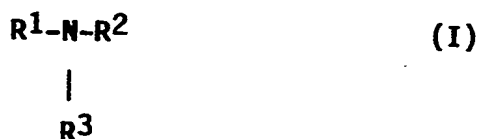
Quaternierte Ester mit besonders guten anwendungstechnischen Eigenschaften werden erhalten, wenn man die ungesättigten Fettsäuren mit Alkanolaminen der Formel (I), in der R^1 , R^2 und R^3 für einen Hydroxyethylrest stehen, umsetzt und die Reaktionsprodukte anschließend mit Alkylierungsmitteln quaterniert.

Gegenstand der Erfindung ist ferner ein Verfahren zur Herstellung von quaternierten Estern, bei dem man

- A) einfach ungesättigten Fettsäuren mit 16 bis 22 Kohlenstoffatomen und einem Gehalt von mindestens 40 Mol-% trans-konfigurierter Doppelbindungen oder deren Ester mit Glycerin oder aliphatischen Alkoholen mit 1 bis 4 Kohlenstoffatomen

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mit Alkanolaminen der Formel (I),



in der R^1 und R^2 Hydroxyalkylreste mit 2 bis 4 Kohlenstoffatomen darstellen und R^3 für R^1 oder einen linearen oder verzweigten Alkylrest mit 1 bis 22 Kohlenstoffatomen steht, umgesetzt und

B) die Reaktionsprodukte anschließend mit Alkylierungsmitteln quaterniert.

Werden freie Fettsäuren in die Reaktion eingesetzt, findet mit den Alkanolaminen eine Veresterung statt. Die Reaktionspartner können dabei in einem molaren Verhältnis von Fettsäure zu Alkanolamin von 1,2 : 1 bis 2,5 : 1 eingesetzt werden. Quaternierte Ester mit besonders guten anwendungstechnischen Eigenschaften weisen im Durchschnitt zwei Estergruppen auf. Es ist daher von Vorteil, die Reaktion mit einem molaren Einsatzverhältnis von 1,5 bis 2,5, insbesondere 1,9 bis 2,2 durchzuführen.

Werden Ester der ungesättigten Fettsäuren eingesetzt, findet mit den Alkanolaminen eine Umesterung statt. Für die Einsatzmengen der Reaktionspartner gelten die oben genannten Bedingungen. Bei der Umesterung von Di- oder Triglyceriden mit Alkanolaminen beziehen sich die molaren Einsatzmengen auf die molare Menge der in den Fettsäureglycerinestern vorhandenen Fettsäureresten.

Die Veresterung der Fettsäuren mit den Alkanolaminen kann bei einer Temperatur von 150 bis 220°C durchgeführt werden. Eine optima-

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le Reaktionsgeschwindigkeit wird erreicht, wenn die Reaktion im Bereich von 180 bis 200°C durchgeführt wird. Die Umsetzung wird dabei solange fortgesetzt, bis das Reaktionsprodukt eine Säurezahl kleiner 5 aufweist.

Die Umesterung der Fettsäureester mit den Alkanolaminen kann bei niedrigeren Temperaturen von 80 bis 220, vorzugsweise 80 bis 150°C, in Gegenwart von 0,1 bis 0,5 Gew.-% eines basischen Katalysators, z. B. Natriummethylat, durchgeführt werden. Der bei der Umsetzung gebildete Alkohol kann, wenn dies gewünscht wird, vor der Quaternierung der Ester durch Destillation entfernt werden.

Nach der Veresterung oder Umesterung wird das Rohprodukt einer Umsetzung mit Alkylierungsmitteln, insbesondere mit linearen oder verzweigten C₁-C₃-Alkyl- oder C₇-C₁₀-Aralkylhalogeniden, -phosphaen oder -sulfaten wie z. B. Methylchlorid, Benzylchlorid, Trimethylphosphat oder vorzugsweise Dimethylsulfat unterworfen. Die Quaternierung kann in Substanz oder in Lösungsmitteln, wie z. B. Wasser oder niederen Alkoholen, bei Temperaturen von 60 bis 120, vorzugsweise 80 bis 100°C durchgeführt werden. Um sicherzustellen, daß das Quaternierungsprodukt frei von nichtabreagiertem Alkylierungsmittel ist, werden pro Mol Ester 0,7 bis 1,0 Mol Alkylierungsmittel eingesetzt.

Besonders gute anwendungstechnische Eigenschaften weisen quaternierte Ester auf, in denen das quaternäre Stickstoffatom zwei langkettige und zwei kurzkettige Substituenten aufweist, beispielsweise Verbindungen, die durch Veresterung von Triethanolamin oder Methyl-diethanolamin mit durchschnittlich zwei Mol ungesättigter Fettsäure und anschließende Quaternierung mit Dimethylsulfat erhalten werden.

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Bei der avivierenden Behandlung von Textilien, wie beispielsweise Gewebe, Gewirke oder Garne, verleihen die quaternierten Ester den Stoffen einen guten Weichgriff und eine hohe Hydrophilie. Sie eignen sich daher als Avivagemittel für Textilien und als Wäsche- weichspülmittel sowie zur Herstellung von Avivage- und Wäsche- weichspülmitteln.

Die folgenden Beispiele sollen den Gegenstand der Erfindung näher erläutern, ohne ihn darauf einzuschränken.

Beispiele

I. Eingesetzte technische Fettsäuren

Fettsäure A wurde durch Selektivhydrierung von technischer Sonnenblumenfettsäure mit einem Gehalt von 62 Gew.-% Linolsäure in Gegenwart von modifizierten Nickelkatalysatoren gemäß dem in **Fette, Seif., Anstrichmitt.**, 88, 387 (1987) beschriebenen Verfahren hergestellt. Fettsäure A wies nach der Selektivhydrierung einen trans-Gehalt von 62 Gew.-% auf. Zur Herstellung der Fettsäuren B - E mit trans-Gehalten von 50 bis 31 Gew.-%, wurde die Fettsäure A mit technischer Ölsäure oder Stearinsäure abgemischt. Die Kennzahlen zu den eingesetzten Fettsäuren sind in Tab.1 zusammengefaßt.

Tab.1: Technische Fettsäuren

Fettsäure	Säurezahl	Iodzahl	<u>trans-Gehalt</u>
			Gew.-%
A	197,7	89,5	62
B	199,5	72,3	50
C	198,2	90,2	50
D	199,0	91,2	31
E	202,5	45,5	32

Die Produkte auf Basis technischer Fettsäuren mit einem trans-Gehalt von mindestens 40 Mol-% (A - C) sind erfindungsgemäß; Produkte auf Basis technischer Fettsäuren mit geringerem trans-Gehalt (D, E) dienen dem Vergleich.

II. Herstellungsbeispiele

Beispiel 1:

Allgemeine Vorschrift zur Kondensation von Fettsäuren mit Triethanolamin. In einem 1-l-Dreihalskolben mit Rührer, Innenthermometer und Rückflußkühler wurden 426 g (1,5 Mol) der Fettsäure A vorgelegt, auf 80°C erwärmt und mit 111,8 g (0,75 Mol) Triethanolamin versetzt. Die Reaktionsmischung wurde in 4 h auf 200°C erhitzt und 1 h bei gleicher Temperatur nachgerührt, wobei 27 g Reaktionswasser abgeschieden wurden. Nach Abkühlung auf 20°C wurden 509 g einer gelben Flüssigkeit erhalten, die eine Säurezahl von 4,7 und 2,0 Gew.-% titrierbarer Stickstoff aufwies.

250 g des Reaktionsproduktes wurden in einen 500 ml-Vierhalskolben mit Rührer, Innenthermometer, Tropftrichter und Rückflußkühler überführt und innerhalb von 1,5 h bei 80 bis 85°C mit 37,9 g Dimethylsulfat quaterniert. Die Reaktionsmischung wurde 1 h bei 85°C nachgerührt. Es wurden 387 g eines halbfesten Produktes erhalten, dessen Quaternierungsgrad - ermittelt durch Differenzbildung nach Zweiphasen-Titration im sauren und alkalischen Medium - 84 Gew.-% betrug. 80 g des quaternierten Produktes und 320 g Wasser wurden über 30 min bei 80°C zu einer feinteiligen Dispersion verrührt und anschließend auf 20°C abgekühlt (Produkt A*).

Beispiele 2 und 3, Vergleichsbeispiele 1 und 2:

Beispiel 1 wurde unter Einsatz technischer Fettsäure mit hohem (Fettsäuren B und C, Beispiele 2 und 3) oder geringem trans-Gehalt (Fettsäuren D und E, Vergleichsbeispiele 1 und 2) wiederholt. Dabei wurden die Produkte B* bis E* erhalten.

III. Anwendungstechnische Beispiele

Durch wiederholtes Waschen gehärtetes Baumwollgewebe (Molton) wurde unter Anwendung des Foulardverfahrens mit den Produkten der Beispiele 1 bis 3 sowie der Vergleichbeispiele 1 und 2 behandelt. Dabei galten folgende Vorgaben:

Konzentration : 30 g/l der 20 gew.-%igen Produkte
Flottenaufnahme : ca. 80 Gew.-% bezogen auf trockenes Gewebe
Trocknung : 3 min bei 180°C

Von den ausgerüsteten Prüfgeweben wurden die Wiederbenetzbarkeit und der Weichgriff beurteilt. Zur Prüfung der Wiederbenetzbarkeit diente der Steighöhentest nach **DIN 53 924**, wobei die Wassersteighöhe in mm nach 1 min bewertet wurde. Die Beurteilung des Weichgriffs erfolgte subjektiv durch 6 erfahrene Personen, die auf einer Skala von 0 = hart und rauh bis 6 = weich und volumniös Noten vergeben konnten. Die Testergebnisse sind in Tab.2 zusammengefaßt:

Unter den gleichen Bedingungen wurde Baumwoll-Frottiergewebe ausgerüstet. Die Beurteilung des Weichgriffs zeigte dem Moltongewebe vergleichbare Ergebnisse.

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Tab.2: Wiederbenetzbarkeit und Weichgriff

Bsp.	Fettsäure	<u>Steighöhe</u> mm	Griffnote
1	A*	10	5,5
2	B*	5	5,5
3	C*	12	5,0
V1	E*	0	5,5
V2	F*	15	4,5

Patentansprüche

1. Quarternierte Ester, erhältlich durch

- A) Umsetzung von einfach ungesättigten Fettsäuren mit 16 bis 22 Kohlenstoffatomen und einem Gehalt von mindestens 40 Mol-% trans-konfigurierter Doppelbindungen oder deren Ester mit Glycerin oder aliphatischen Alkoholen mit 1 bis 4 Kohlenstoffatomen

mit Alkanolaminen der Formel (I),



in der R^1 und R^2 unabhängig voneinander Hydroxyalkylreste mit 2 bis 4 Kohlenstoffatomen darstellen und R^3 für R^1 oder einen linearen oder verzweigten Alkylrest mit 1 bis 22 Kohlenstoffatomen steht und

- B) anschließende Quaternierung der Reaktionsprodukte mit Alkylierungsmitteln.

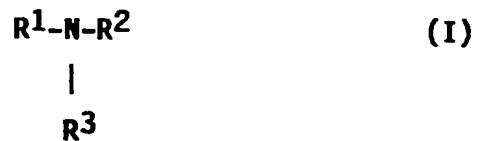
2. Quaternierte Ester nach Anspruch 1, dadurch gekennzeichnet, daß technische Elaidinsäure oder deren Ester mit Alkanolaminen umgesetzt werden.
3. Quaternierte Ester nach einem der Ansprüche 1 und 2, dadurch gekennzeichnet, daß R^1 , R^2 und R^3 in Formel (I) für einen Hydroxyethylrest stehen.

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4. Verfahren zur Herstellung von quaternierten Estern, dadurch gekennzeichnet, daß

A) einfach ungesättigte Fettsäuren mit 16 bis 22 Kohlenstoffatomen und einem Gehalt von mindestens 40 Mol-% trans-konfigurierter Doppelbindungen oder deren Ester mit Glycerin oder aliphatischen Alkoholen mit 1 bis 4 Kohlenstoffatomen

mit Alkanolaminen der Formel (I),



in der R^1 und R^2 unabhängig voneinander Hydroxyalkylreste mit 2 bis 4 Kohlenstoffatomen darstellen und R^3 für R^1 oder einen linearen oder verzweigten Alkylrest mit 1 bis 22 Kohlenstoffatomen steht, ungesetzt und

- B) die Reaktionsprodukte anschließend mit Alkylierungsmitteln quaterniert werden.
5. Verfahren nach Anspruch 4, dadurch gekennzeichnet, daß technische Elaidinsäure oder deren Ester mit Alkanolaminen umgesetzt werden.
6. Verfahren nach einem der Ansprüche 4 und 5, dadurch gekennzeichnet, daß R^1 , R^2 und R^3 in Formel (I) für einen Hydroxyethylrest stehen.

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7. Verfahren nach mindestens einem der Ansprüche 4 bis 6, dadurch gekennzeichnet, daß die Umsetzung der ungesättigten Fettsäuren oder deren Ester mit den Alkanolaminen in einem molaren Verhältnis von 1,2 : 1 bis 2,5 : 1 durchgeführt wird.
8. Verfahren nach mindestens einem der Ansprüche 4 bis 7, dadurch gekennzeichnet, daß die Veresterung der ungesättigten Fettsäuren mit den Alkanolaminen bei einer Temperatur von 150 bis 220°C durchgeführt wird.
9. Verfahren nach mindestens einem der Ansprüche 4 bis 7, dadurch gekennzeichnet, daß die Umesterung der ungesättigten Fettsäureester mit den Alkanolaminen bei einer Temperatur von 80 bis 220°C durchgeführt wird.
10. Verfahren nach mindestens einem der Ansprüche 4 bis 9, dadurch gekennzeichnet, daß die Quaternierung mit Dimethylsulfat durchgeführt wird.
11. Verfahren nach mindestens einem der Ansprüche 4 bis 10, dadurch gekennzeichnet, daß die Quaternierung bei Temperaturen von 60 bis 120°C durchgeführt wird.
12. Verwendung der quaternierten Ester, erhältlich nach dem Verfahren nach mindestens einem der Ansprüche 4 bis 11 als Avivagemittel für Textilien oder Wäscheweichspülmittel.
13. Verwendung der quaternierten Ester, erhältlich nach dem Verfahren nach mindestens einem der Ansprüche 4 bis 11 zur Herstellung von Avivage- oder Wäscheweichspülmitteln.

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP91/00863

I. CLASSIFICATION AND SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl.5 C07C 219/08 C11D 1/62 D06M 13/463																							
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Classification System</td> <td style="width: 50%; border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">Int.Cl.5</td> <td style="padding: 5px;">C07C 219/00</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div>			Classification System	Classification Symbols	Int.Cl.5	C07C 219/00																	
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(51) Internationale Patentklassifikation ⁵ : C11D 1/62, 3/00, D06M 13/463		A1	(11) Internationale Veröffentlichungsnummer: WO 93/21291 (43) Internationales Veröffentlichungsdatum: 28. Oktober 1993 (28.10.93)
(21) Internationales Aktenzeichen: PCT/EP93/00794 (22) Internationales Anmeldedatum: 1. April 1993 (01.04.93) (30) Prioritätsdaten: P 42 12 156.6 10. April 1992 (10.04.92) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN [DE/DE]; Henkelstraße 67, D-4000 Düsseldorf 13 (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US) : KIHN-BOTULINSKI, Martina [DE/DE]; Nesselrode-Straße 24, D-4047 Dormagen-Zons (DE). VÖLKEL, Theodor [DE/DE]; Sudentenstraße 36, D-4000 Düsseldorf (DE). PUCHTA, Rolf [DE/DE]; Schubertweg 1, D-5657 Haan (DE). SANDKÜHLER, Peter [DE/DE]; Am Jägersteig 8, D-4010 Hilden (DE).		(81) Bestimmungsstaaten: CA, CZ, HU, JP, KR, PL, SK, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Veröffentlicht <i>Mit internationalem Recherchenbericht.</i>	
(54) Title: LOW-VISCOSITY AQUEOUS TEXTILE-TREATMENT AGENTS (54) Bezeichnung: WÄSSRIGE TEXTIL-BEHANDLUNGSMITTEL MIT GERINGER VISKOSITÄT (57) Abstract Described are textile-treatment agents containing as a softener quaternary ammonium compounds with 1, 2 or 3 acyloxyalkyl groups (in which the acyl group is derived from a fatty acid) bound to the nitrogen atom. Such compounds have a low viscosity if all or some of the acyl groups are derived from unsaturated fatty acids with at least 30 % in the cis form. (57) Zusammenfassung Wässrige Textil-Behandlungsmittel, die als weichmachenden Wirkstoff quartäre Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyalkylresten am Stickstoff gebunden enthalten, haben eine niedrige Viskosität, wenn die Fettacylgruppen sich ganz oder teilweise von ungesättigten Fettsäuren ableiten, die zu wenigstens 30 % in cis-Form vorliegen.			

LEDIGLICH ZUR INFORMATION

Code, die zur Identifizierung von PCT-Vertragsstaaten auf den Kopfhögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

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"Wäßrige Textil-Behandlungsmittel mit geringer Viskosität"

Die vorliegende Patentanmeldung betrifft wäßrige Textilweichmacher-Konzentrate, die trotz hoher Konzentration an quartären Ammoniumverbindungen, die 1, 2 oder 3 Fettacyloxyalkylreste am Stickstoff gebunden enthalten, eine niedrige Viskosität haben, die sich auch bei längerer Lagerung nicht oder nur unwesentlich erhöht.

Mittel zum Behandeln von Textilien, die den damit behandelten Textilien eine erwünschte Weichheit verleihen, sind seit langem bekannt. Quartäre Ammoniumverbindungen, die wegen ihres kationischen Charakters leicht und vollständig auf die negativ geladene Faseroberfläche aufziehen, sind dabei besonders gern eingesetzte Wirkstoffe. Wegen ihrer leichten biologischen Abbaubarkeit haben in letzter Zeit vor allem solche quartäre Ammoniumverbindungen an Interesse gewonnen, die Fettacyloxyalkylreste am Stickstoff gebunden enthalten. Derartige Verbindungen sind ebenfalls seit langem bekannt, beispielsweise aus der DE-A-16 19 058, der DE-A-19 35 499 oder der US 3, 915, 867. Man kann diese Verbindungen beispielsweise leicht durch Veresterung von Alkanolaminen mit Fettsäure oder durch Umesterung von Fettsäureestern mit Alkanolamin und anschließender Quaternierung herstellen. Entsprechende Verfahren zur Herstellung im großtechnischen Maßstab sind ebenfalls seit langem bekannt.

Die Behandlung von Textilien mit den genannten quartären Ammoniumverbindungen mit Fettacyloxyalkylresten erfolgt in wäßrigen Behandlungsflotten, die pro Liter etwa ein oder wenige Gramm an quartären Ammoniumverbindungen, gegebenenfalls in Kombination mit anderen weichmachenden Wirkstoffen sowie Hilfs- und Zusatzstoffen enthalten. Bei der Herstellung und der Konfektionierung strebt man gießfähige und leicht mit Wasser verdünnbare Zubereitungen an, die eine wesentlich höhere Konzentration an Wirkstoffen

enthalten, als es der Anwendungskonzentration entspricht. So sind beispielsweise Handelsprodukte bekannt, wie etwa 4 Gew.-% an quartären Ammoniumverbindungen des oben beschriebenen Typs enthalten. Das heißt, der Hauptbestandteil derartiger Produkte ist Wasser. Es hat daher nicht an Versuchen gefehlt, Produkte mit einem höherem Wirkstoffgehalt herzustellen, die erst unmittelbar vor der Anwendung vom Verbraucher auf die gewünschte Anwendungskonzentration verdünnt werden. Es sind daher auch Handelsprodukte entwickelt worden, die etwa 50 Gew.-% an weichmachenden Wirkstoffen enthalten. Derart hoch konzentrierte Produkte weisen aber auch den Nachteil auf, daß ihre Viskosität sehr hoch ist und beim Lagern oft sogar noch zunimmt, bzw., daß ihre Verdünnbarkeit mit Wasser auf die Anwendungskonzentration oft problematisch ist.

Gegenstand der vorliegenden Erfindung ist daher, ein wäßriges Textilweichmacher-Konzentrat mit geringer Viskosität bereitzustellen, das die wegen ihrer leichten biologischen Abbaubarkeit interessanten quartären Ammoniumverbindungen, die 1, 2 oder 3 Fettacyloxyalkylreste am Stickstoffatom gebunden enthalten, enthält und dessen Viskosität auch nach längerer Lagerung nicht oder nur unwesentlich ansteigt. Überraschenderweise hat sich dabei herausgestellt, daß der Anteil von Fettacylgruppen, die sich ganz oder teilweise von in cis-Form vorliegenden ungesättigten Fettsäuren ableiten, einen Einfluß auf das Viskositäts- und das Lagerungsverhalten haben.

Die Erfindung betrifft daher wäßrige Textilweichmacher-Konzentrate mit geringer Viskosität, enthaltend quartäre Ammoniumverbindungen, die 1, 2 oder 3 Fettacyloxyalkylreste am Stickstoffatom gebunden enthalten, und die dadurch gekennzeichnet sind, daß die Fettacylgruppen sich ganz oder teilweise von ungesättigten Fettsäuren ableiten, die zu wenigstens 30 % in cis-Form vorliegen. Im Rahmen dieser Patentanmeldung bedeutet "geringe Viskosität" eine Viskosität von höchstens 1000 mPas. Bei der Herstellung von quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyalkylresten ist es daher wichtig, solche Fettsäuren, bzw. Fettsäure-Derivate zu verwenden, die sich ganz oder teilweise von ungesättigten Fettsäuren ableiten, die zu wenigstens 55 % in cis-Form vorliegen. Damit lassen sich Textilweichmacher-Konzentrate herstellen, die auch bei niedrigen Temperaturen

lagerstabil sind und darüberhinaus noch eine geringe Empfindlichkeit gegenüber Scherbelastung, zum Beispiel beim Pumpen oder Abfüllen aufweisen. Bevorzugt ist, daß wenigstens 50 %, insbesondere wenigstens 70 % der sich von ungesättigten Fettsäuren ableitenden Fettacylgruppen in cis-Form vorliegen. Ein hoher Anteil an in cis-Form vorliegenden Fettacylgruppen wirkt sich ausgesprochen günstig auf die Viskosität bei der Herstellung und Lagerung von erfindungsgemäßen Textilweichmacher-Konzentraten aus. Unter Textilweichmacher-Konzentraten im Sinne der vorliegenden Patentanmeldung sind solche wäßrige Zubereitungen zu verstehen, die quartäre Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten in einer Konzentration von 4 bis 55 Gew.-%, bezogen auf die Gesamtmenge des Konzentrats enthalten; derartige Textilweichmacher-Konzentrate sind daher bevorzugt. In gewissem Sinne gilt das für quartäre Ammoniumverbindungen mit Fettacyloxyethylresten enthaltende Produkte Gesagte auch für solche Produkte, die quartäre Ammoniumverbindungen mit anderen Fettacyloxyalkylresten als Fettacyloxyethylreste enthalten, beispielsweise für Produkte, die quartäre Ammoniumverbindungen mit Fettacyloxypropylresten und mit Fettacyloxyisopropylresten enthalten. Wegen ihres hohen Wirkstoffanteils sind Textilweichmacher-Konzentrate mit 15 bis 40 Gew.-% quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten eine bevorzugte Ausführungsform der vorliegenden Erfindung. Bei der Herstellung von Konzentraten geht man zweckmäßigerweise von quartären Ammoniumverbindungen aus, deren Fettacylreste zu einem großen Anteil ungesättigt sind, beispielsweise Ölsäurereste sind. Neben Wasser setzt man in Konzentraten auch nennenswerte Mengen organischer Lösemittel ein.

Die zuvor beschriebenen Textilweichmacher können als Wirkstoff zwar grundsätzlich quartäre Ammoniumverbindungen enthalten, die entweder 1 oder 2 oder 3 Fettacyloxyalkylreste enthalten. Da derartige Verbindungen im industriellen Maßstab aber nur aufwendig herstellbar sind, sind Textilweichmacher-Konzentrate bevorzugt, die quartäre Ammoniumverbindungen in Form eines Gemischs von Verbindungen mit 1, 2 oder 3 Fettacyloxyalkylresten, insbesondere mit 1, 2 und 3 Fettacyloxyethylresten enthalten. Dabei werden solche Textilweichmacher-Konzentrate bevorzugt, die in dem Gemisch der quartären Ammoniumverbindungen solche Verbindungen enthalten,

bei denen der Anteil mit 2 Fettacyloxyalkylresten größer ist als der Anteil quartärer Ammoniumverbindungen mit 1 oder 3 Fettacyloxyethylresten.

Die erfindungsgemäßen Textilweichmacher-Konzentrate enthalten zusätzlich in wäßrigen Textilweichmacher-Konzentraten übliche Hilfsstoffe wie beispielsweise Dispergatoren, Konservierungsmittel, anorganische oder organische Säuren, Puffersubstanzen, Elektrolyte, Viskositätsstellmittel, Farbstoffe, Duftstoffe oder Lösungsmittel. Die genannten Hilfsstoffe können fakultativ zusätzlich in erfindungsgemäßen wäßrigen Textilweichmacher-Konzentraten enthalten sein. In einer weiteren bevorzugten Ausführungsform enthalten die erfindungsgemäßen Textilweichmacher-Konzentrate neben quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten zusätzlich einen oder mehrere andere weichmachende Wirkstoffe anderer Verbindungsklassen. Beispiele hierfür sind Sorbitanester, quellfähige Schichtsilikate, Fettsäurekondensationsprodukte mit Polyaminen, quartäre Ammoniumverbindungen mit Fettalkyl- bzw. -alkenylresten, Alkylpolyglykoside oder Fettsäuren.

Zweckmäßigerweise werden die erfindungsgemäßen Textilweichmacher-Konzentrate auf einen pH-Wert im Bereich von 2,5 bis 7, vorzugsweise im Bereich von 2,5 bis 5, gemessen bei 20 °C nach Verdünnen mit destilliertem Wasser auf eine Konzentration zwischen 0,5 und 5 Gew.-% quartärer Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten eingestellt. Von besonderer praktischer Bedeutung sind Textilweichmacher-Konzentrate, die einen pH-Wert im Bereich von 2,5 bis 4,5, gemessen bei einer Konzentration zwischen 0,5 und 2,0 Gew.-% quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten haben. Derartige Textilweichmacher-Konzentrate sind daher besonders bevorzugt.

Wäßrige Textilweichmacher-Konzentrate, die quartäre Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyalkylresten am Stickstoff gebunden enthalten und deren Fettacylgruppen sich ganz oder teilweise von ungesättigten Fettsäuren ableiten, die zu wenigstens 55 Gew.-% in cis-Form vorliegen und deren wäßrige Verdünnungen die obengenannte pH-Werte haben, lassen sich leicht zu lagerstabilen Produkten konfektionieren, deren Viskosität auch bei Lagerung bei niedrigen Temperaturen nicht oder nur unwesentlich

ansteigt und die gegenüber Scherbelastung unempfindlich sind. Die genannten Vorteile gehen ganz oder teilweise verloren, wenn zur Herstellung der genannten Produkte quartäre Ammoniumverbindungen verwendet werden, deren Fettacyloxyalkylgruppen sich von Fettsäuren ableiten, deren Anteil an ungesättigten Fettsäuren in cis-Form unter 30 % liegt.

B e i s p i e l eBeispiele 1 bis 8

Eine quartäre Ammoniumverbindung mit der idealisierten Formel Methylhydroxyethyldifettacyloxyethyl-ammonium-methosulfat wurde zur Herstellung eines wäßrigen Weichspülmittel-Konzentrats mit 17,2 Gew.-% quartärer Ammoniumverbindung verwendet. Der Fettrest leitete sich von Talgfettsäure mit einem ungesättigten Anteil ab, der in unterschiedlichem cis/trans-Verhältnis vorlag.

Bei mehreren Lagertemperaturen wurden die Konzentrate mit und ohne vorheriger Scherbelastung bis zu 12 Wochen lang gelagert und die Viskositätsveränderung gemessen. Die Ergebnisse und die Versuchsbedingungen sind aus den folgenden Abbildungen 1 bis 8 ersichtlich.

Wie zu sehen ist, führt ein cis/trans-Verhältnis von 30 : 70 bei allen Lagertemperaturen mit und ohne Scherbelastung zu einem unerwünschten Viskositätsanstieg bereits nach wenigen Tagen, wohingegen bei einem cis/trans-Verhältnis von 70 : 30 unabhängig von der Scherbelastung kein nennenswerter Viskositätsanstieg auch nach 12-wöchiger Lagerung erfolgt. Dieser durch ein cis/trans-Verhältnis von über 50 : 50 bewirkte Effekt ließ sich weder durch Zusätze von organischen Lösungsmitteln (Glycerin, Dipropylglykol) noch Magnesiumchlorid oder Ammoniumchlorid erzielen.

P a t e n t a n s p r ü c h e

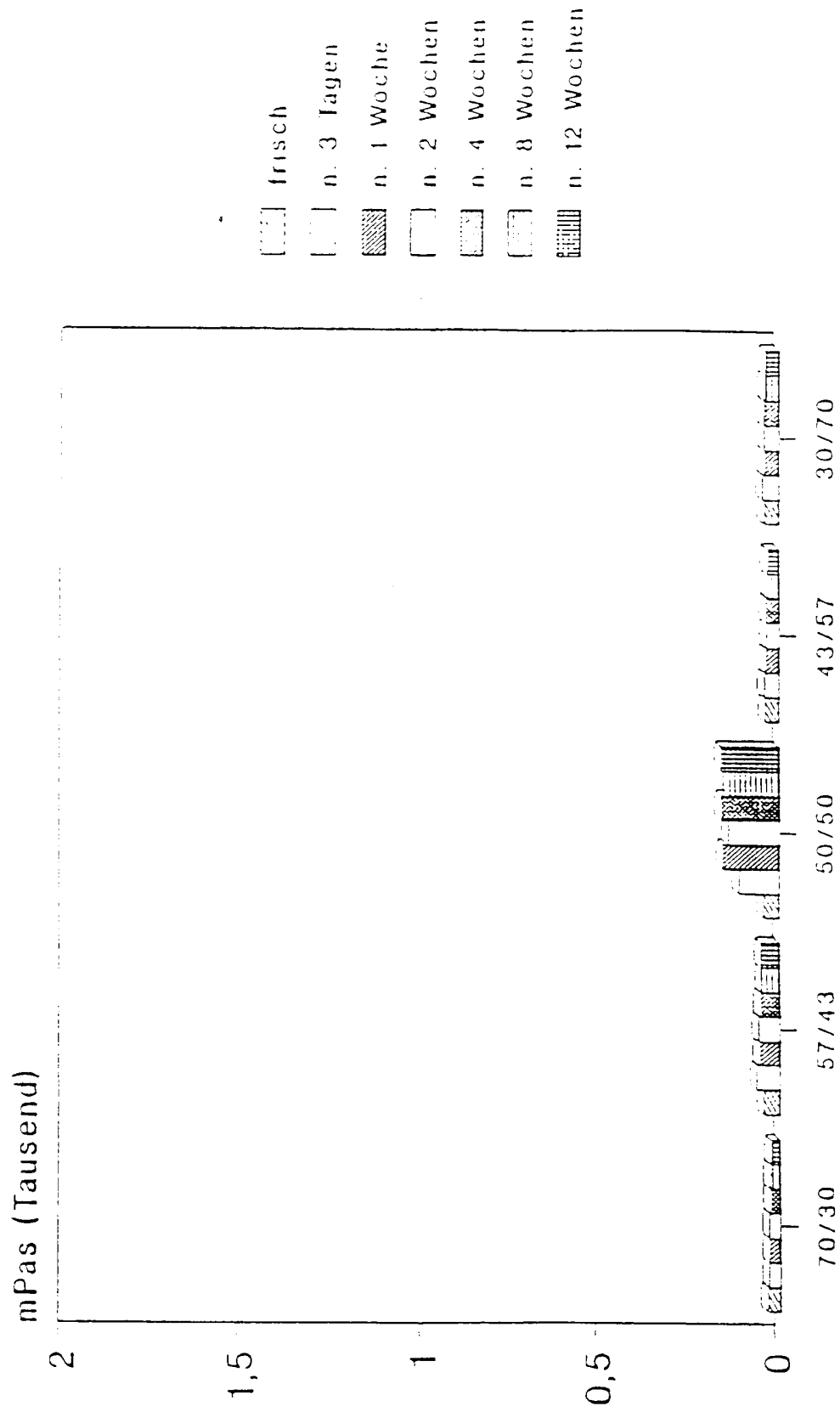
1. Wäßrige Textil-Behandlungsmittel mit geringer Viskosität enthaltend quartäre Ammoniumverbindungen, die 1, 2 oder 3 Fettacyloxyalkylreste am Stickstoffatom gebunden enthalten, dadurch gekennzeichnet, daß die Fettacylgruppen sich ganz oder teilweise von ungesättigten Fettsäuren ableiten, die zu wenigstens 30 % in cis-Form vorliegen.
2. Textil-Behandlungsmittel nach Anspruch 1, dadurch gekennzeichnet, daß wenigstens 50 % und insbesondere wenigstens 70 % der sich von ungesättigten Fettsäuren ableitenden Fettacylgruppen in cis-Form vorliegen.
3. Textil-Behandlungsmittel nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, daß sie quartäre Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten in einer Konzentration von 4 bis 55 Gew.-%, bezogen auf die Gesamtmenge des Konzentrats, enthalten.
4. Textil-Behandlungsmittel nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß sie 15 bis 40 Gew.-% quartäre Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten enthalten.
5. Textil-Behandlungsmittel nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die quartäre Ammoniumverbindung ein Gemisch von Verbindungen mit 1, 2 und 3 Fettacyloxyethylresten darstellt.
6. Textil-Behandlungsmittel nach Anspruch 5, dadurch gekennzeichnet, daß in dem Gemisch quartäre Ammoniumverbindungen mit 2 Fettacyloxyethylresten in größerer Menge enthalten sind als quartäre Ammoniumverbindungen mit 1 oder 3 Fettacyloxyethylresten.

- 8 -

7. Textil-Behandlungsmittel nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß sie zusätzlich in wäßrigen Textilweichmacher-Konzentraten übliche Hilfsstoffe wie Dispergatoren, Konservierungsmittel, anorganische oder organische Säuren, Puffersubstanzen, Elektrolyte, Viskositätsstellmittel, Farbstoffe, Duftstoffe und Lösungsmittel enthalten.
8. Textil-Behandlungsmittel nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß sie als weichmachenden Wirkstoff neben quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten zusätzlich einen oder mehrere weichmachende Wirkstoffe anderer Verbindungsklassen enthalten.
9. Textil-Behandlungsmittel nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß sie einen pH-Wert im Bereich von 2,5 bis 7, vorzugsweise im Bereich von 2,5 bis 5, gemessen bei 20 °C nach Verdünnen mit destilliertem Wasser auf eine Konzentration zwischen 0,5 und 5 Gew.-% quartären Ammoniumverbindungen mit 1, 2 oder 3 Fettacyloxyethylresten, haben.
10. Textil-Behandlungsmittel nach Anspruch 9, dadurch gekennzeichnet, daß sie einen pH-Wert im Bereich von 2,5 bis 4,5, gemessen bei einer Konzentration zwischen 0,5 und 2,0 Gew.-% quartären Ammoniumverbindungen, haben.

...

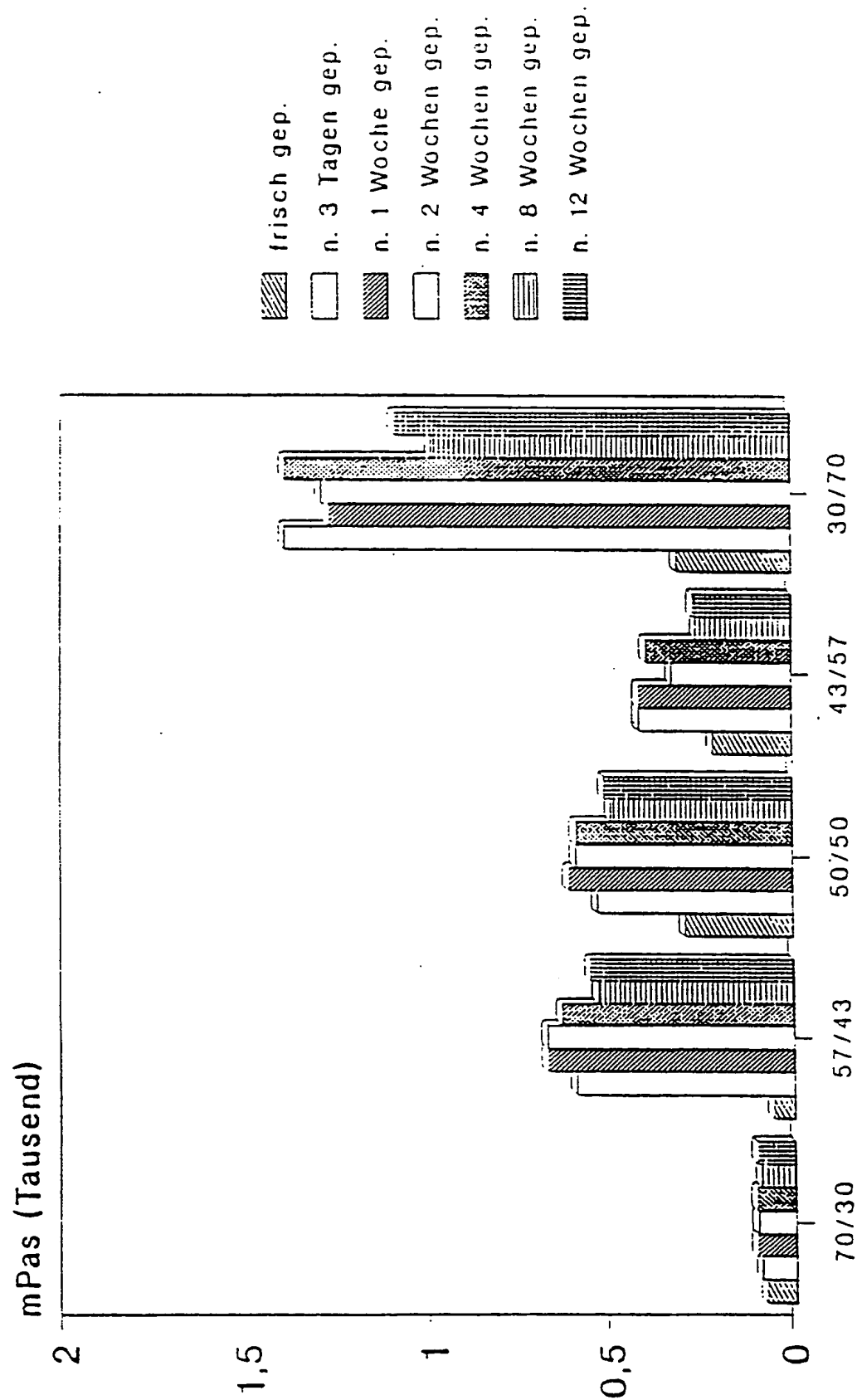
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Abb 1

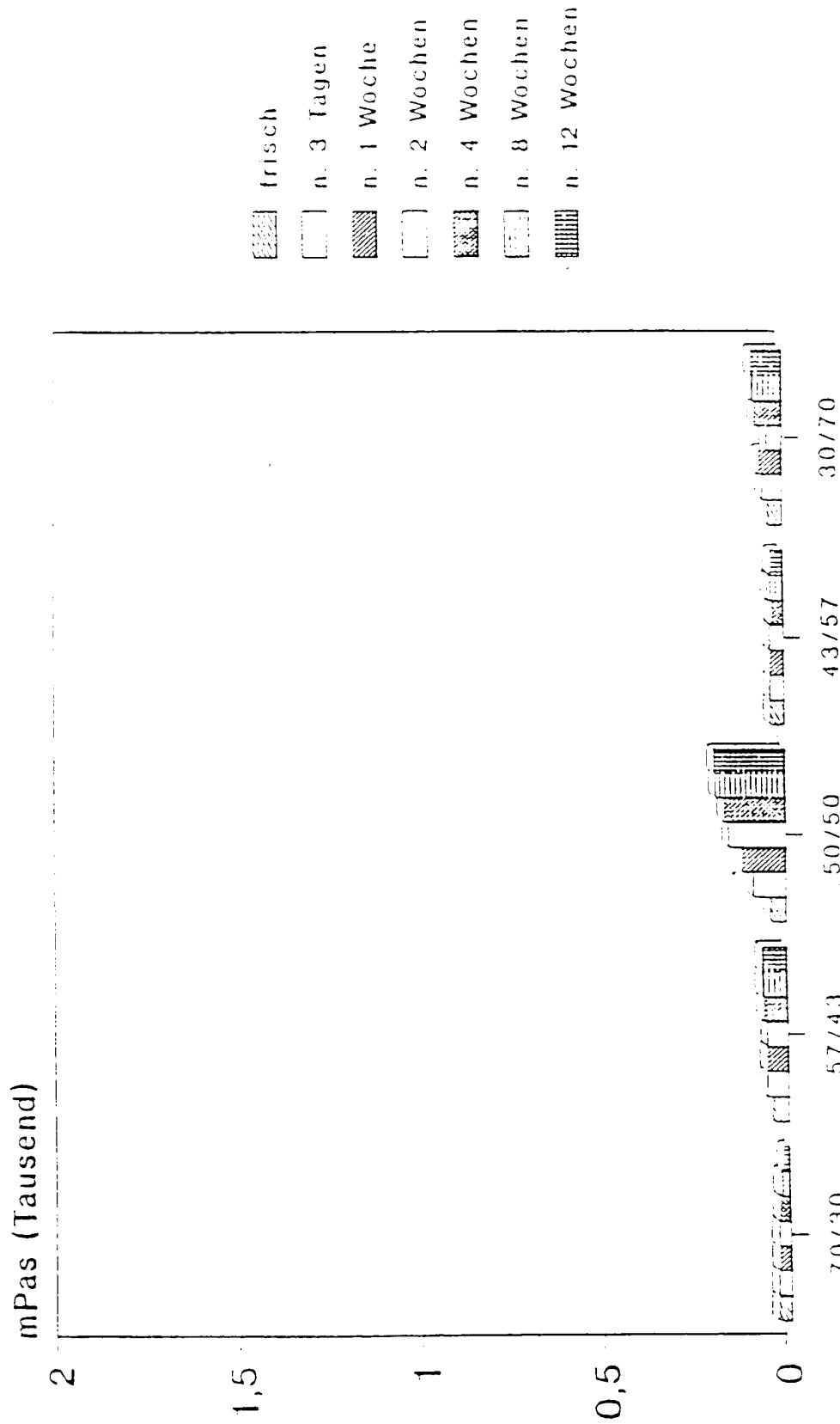
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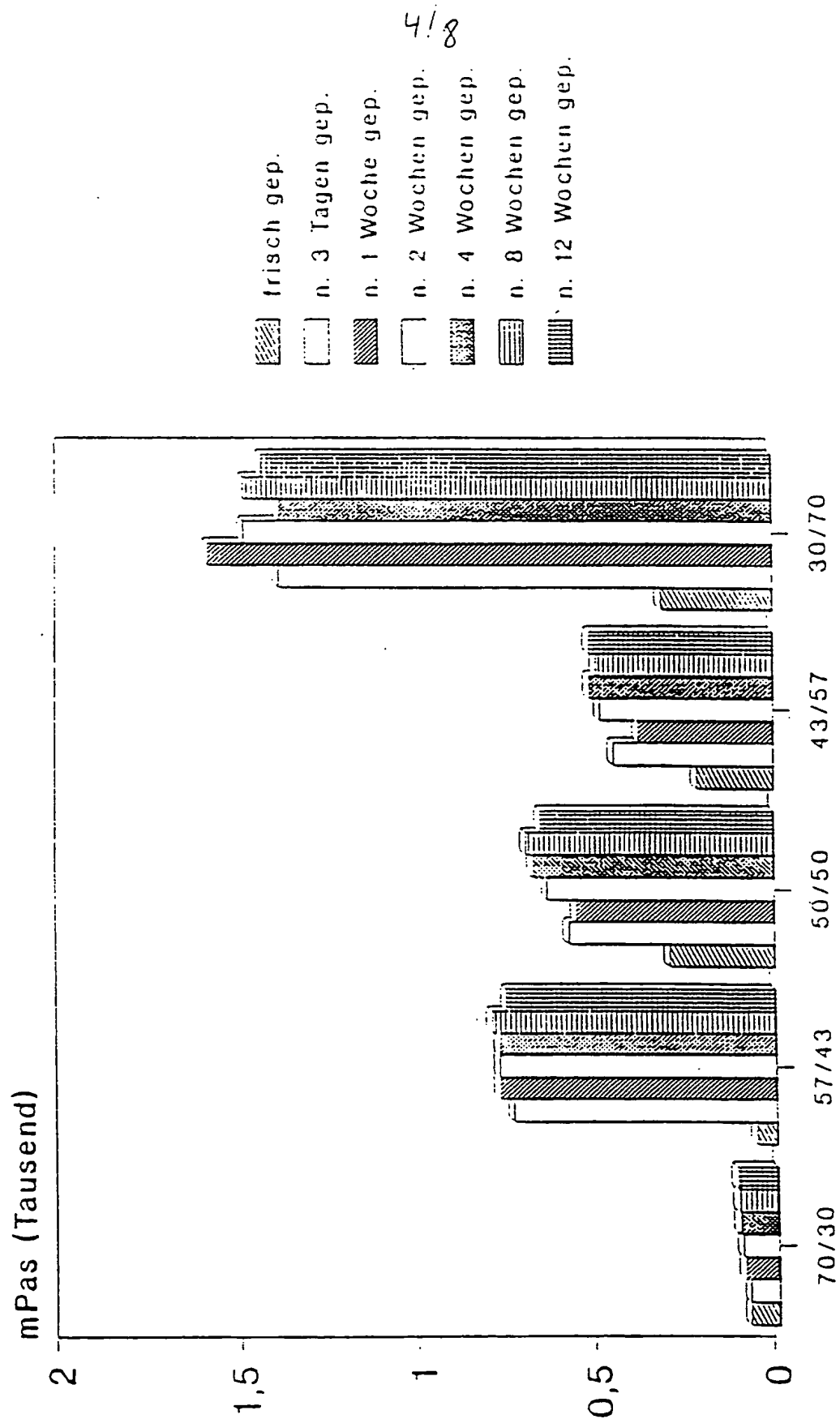
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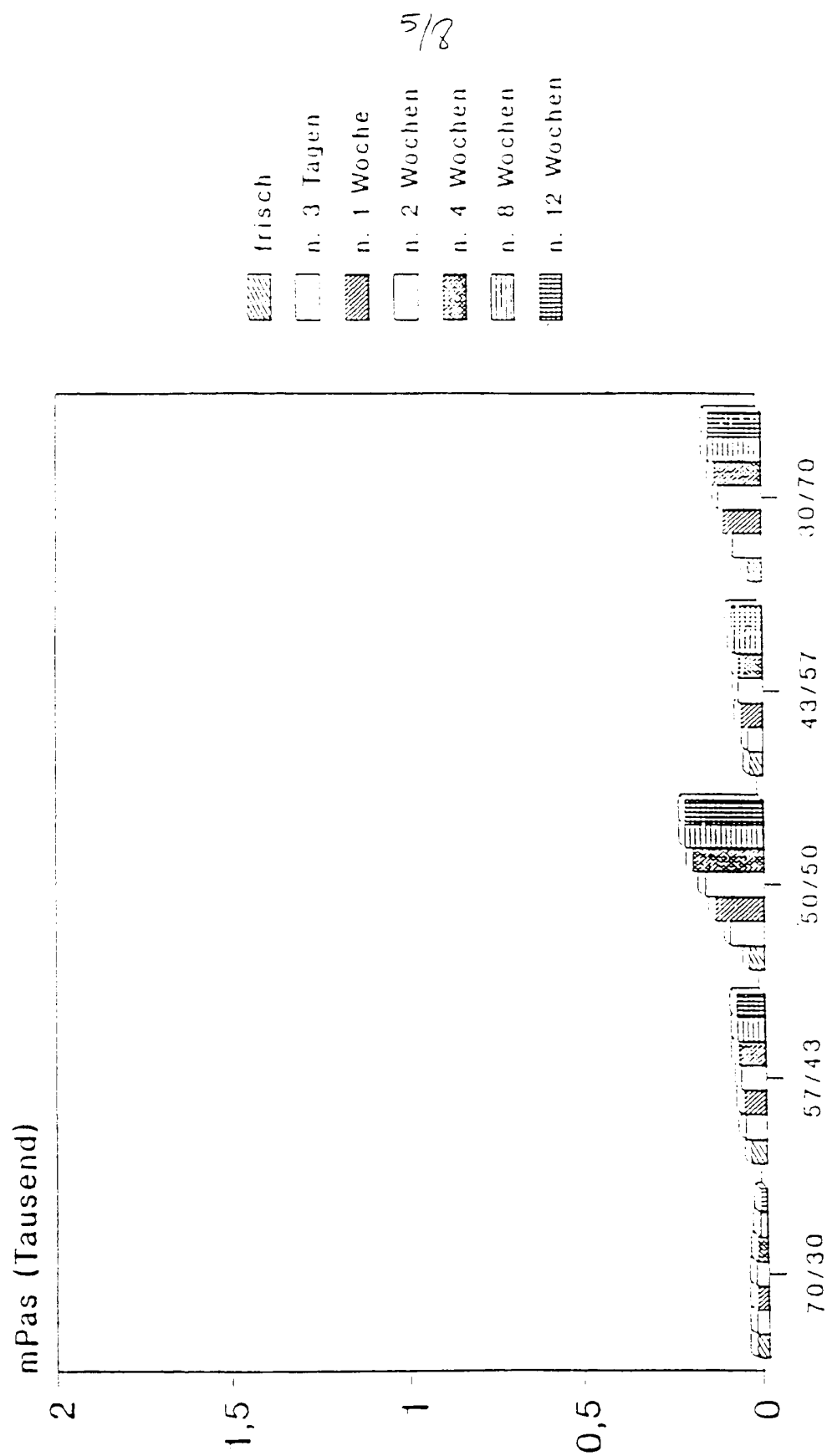
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Abb 3



Cis / Trans - Verhältniss

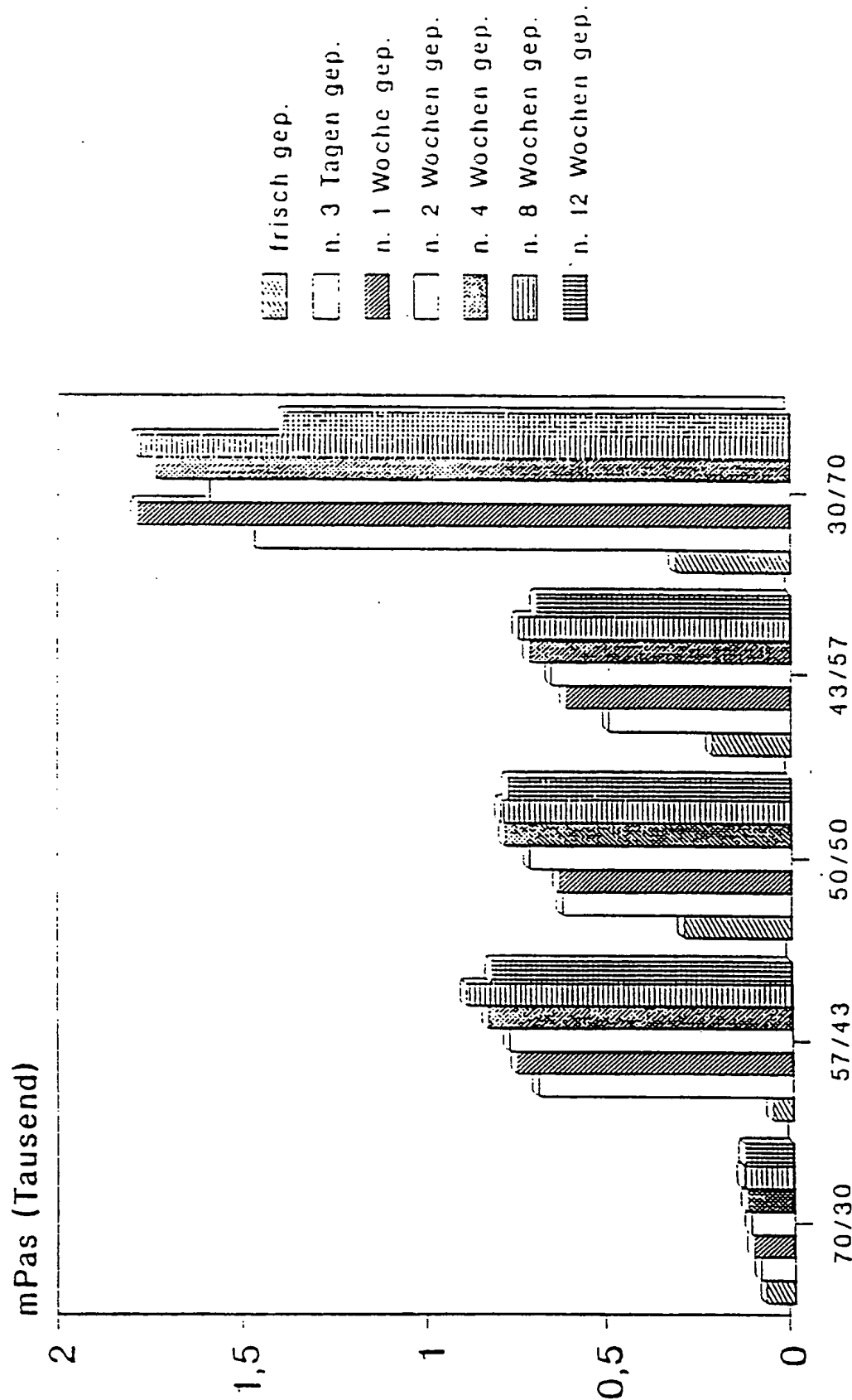
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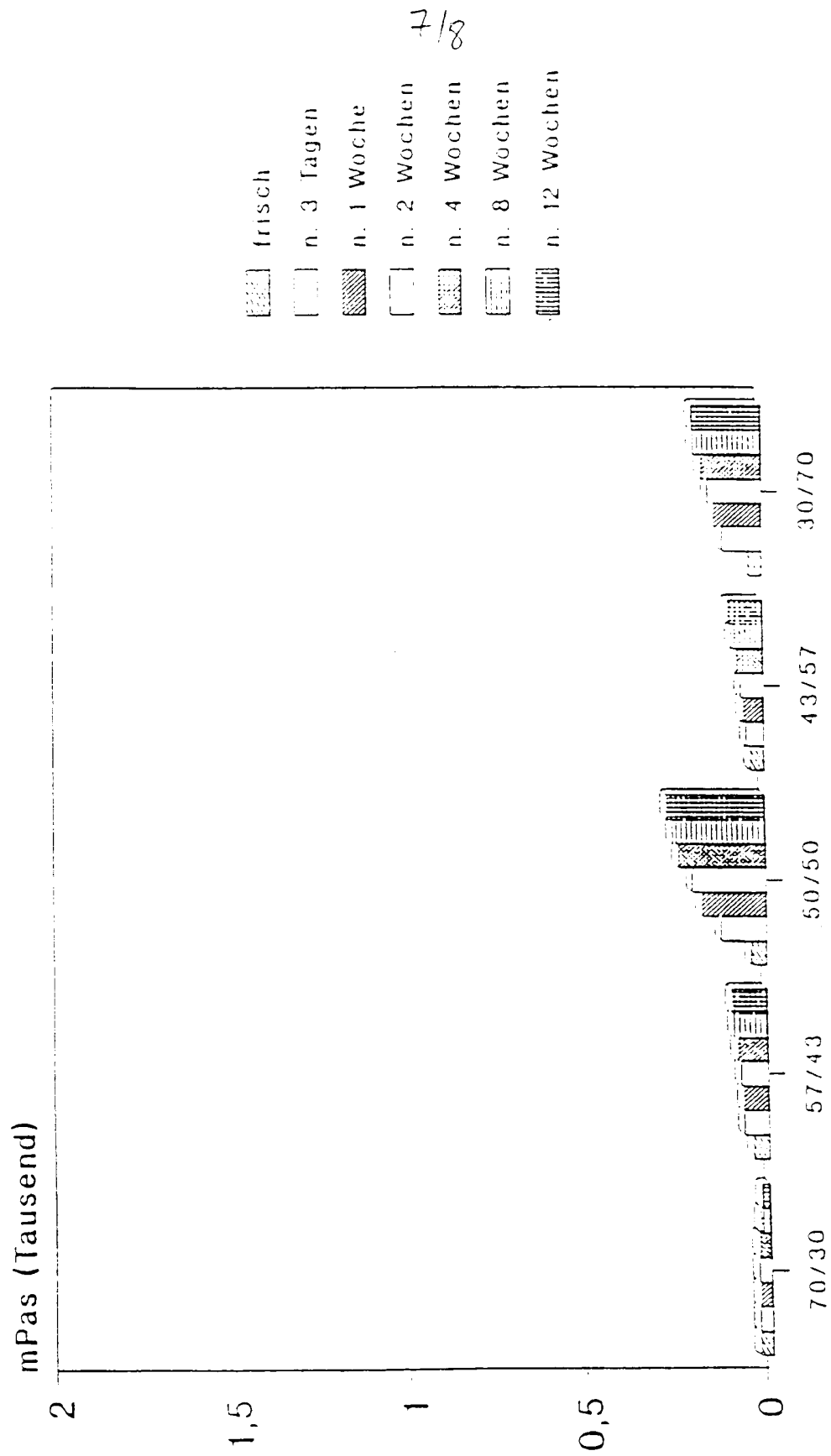
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Cis / Trans - Verhältniss

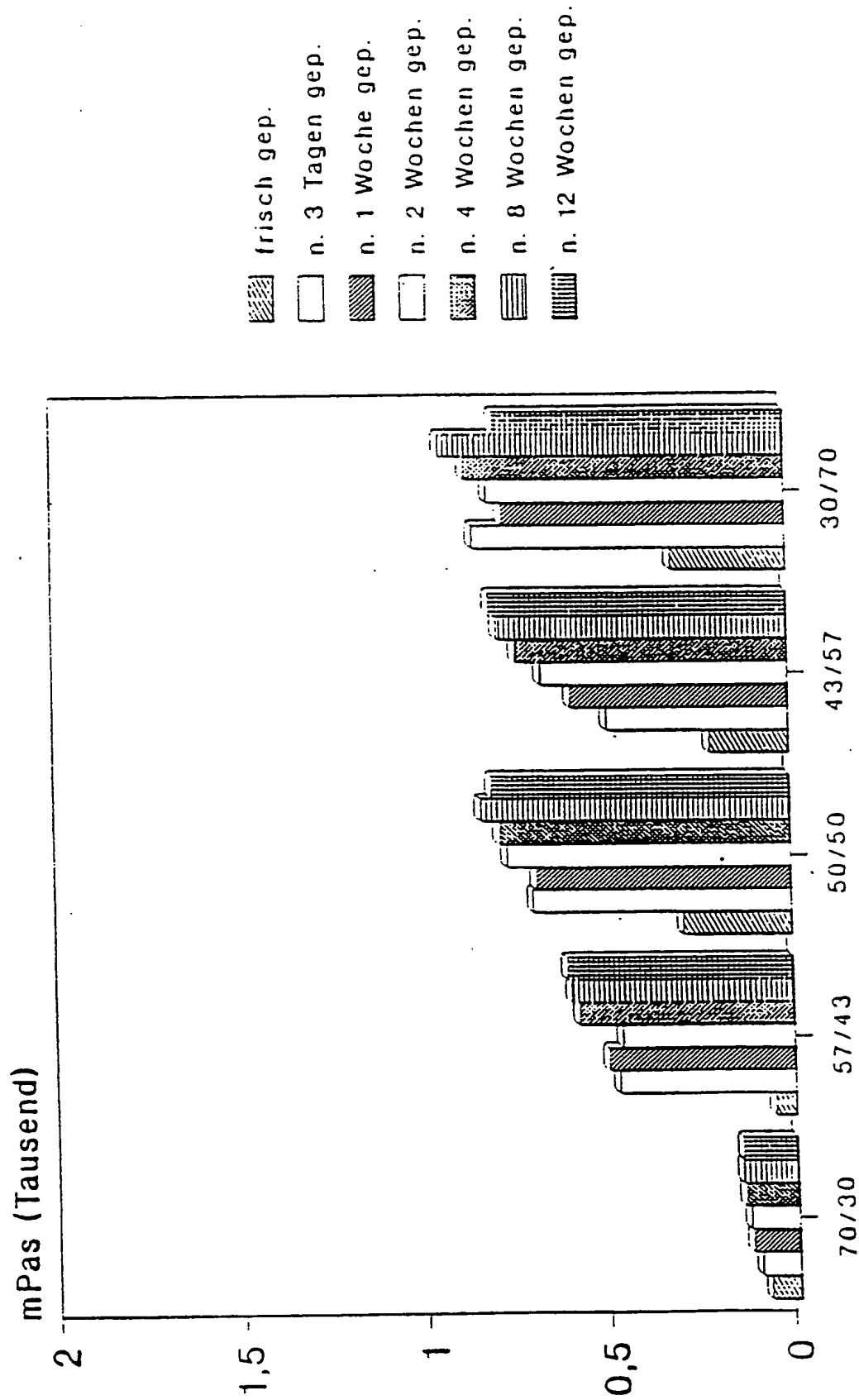
Abb 6



Cis / Trans - Verhältniss

Abb 7

8/8



Cis / Trans - Verhältniss

Abb 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 93/00794

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.⁵ C11D1/62; C11D3/00; D06M13/463
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl.⁵ C11D ; D06M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,9 117 974 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 28 November 1991 see claims	1-10
X	EP,A,0 370 675 (KAO CORPORATION) 30 May 1990 see page 2, line 30 - page 3, line 34 see page 4, line 6 - line 31; claims	1-10
A	DATABASE WPI Week 9032, Derwent Publications Ltd., London, GB; AN 90-243078 & JP,A,2 169 768 (KAO CORP.) 29 June 1990 see abstract	1-10
./.		

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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Date of the actual completion of the international search

8 July 1993 (08.07.93)

Date of mailing of the international search report

31 July 1993 (31.07.93)

Name and mailing address of the ISA/

EUROPEAN PATENT OFFICE

Facsimile No.

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 93/00794

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim N .
A	DE,A,1 935 499 (BADISCHE ANILIN- & SODA-FABRIK AG.) 14 January 1971 cited in the application see the whole document	1-10
A	— DATABASE WPI Week 8921, Derwent Publications Ltd., London, GB; AN 89-153907 & JP,A,1 093 514 (NEW JAPAN CHEM.) 12 April 1989 see abstract —	1-10

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9300794
SA 72530

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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08/07/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A-9117974	28-11-91	DE-A- 4015849	21-11-91
		AU-A- 7851591	10-12-91
		EP-A- 0528899	03-03-93
EP-A-0370675	30-05-90	JP-A- 2139480	29-05-90
		JP-B- 4028826	15-05-92
		CA-A- 2003324	21-05-90
		US-A- 5023003	11-06-91
DE-A-1935499	14-01-71	BE-A- 753296	11-01-71
		FR-A- 2054337	16-04-71
		NL-A- 7010103	14-01-71

I. KLASSEFIZIKATION DES ANMELDUNGS-GEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben) ⁶		
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Int.Kl. 5 C11D1/62; C11D3/00; D06M13/463		
II. RECHERCHIERTE SACHGEBIETE		
Recherchierter Mindestprüfstoff ⁷		
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III. EINSCHLAGIGE VERÖFFENTLICHUNGEN ⁹		
Art. ⁹	Kennzeichnung der Veröffentlichung ¹¹ , soweit erforderlich unter Angabe der maßgeblichen Teile ¹²	Betr. Anspruch Nr. ¹³
X	WO,A,9 117 974 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 28. November 1991 siehe Ansprüche	1-10
X	EP,A,0 370 675 (KAO CORPORATION) 30. Mai 1990 siehe Seite 2, Zeile 30 - Seite 3, Zeile 34 siehe Seite 4, Zeile 6 - Zeile 31; Ansprüche	1-10
A	DATABASE WPI Week 9032, Derwent Publications Ltd., London, GB; AN 90-243078 & JP,A,2 169 768 (KAO CORP.) 29. Juni 1990 siehe Zusammenfassung	1-10
<p>¹⁰ Besondere Kategorien von angegebenen Veröffentlichungen:</p> <p>"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist</p> <p>"E" Älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist</p> <p>"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)</p> <p>"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht</p> <p>"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist</p> <p>"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist</p> <p>"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden</p> <p>"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist</p> <p>"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist</p>		
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EUROPAISCHES PATENTAMT		BLAS V.

III. ZUSCHLAGIGE VERÖFFENTLICHUNGEN (Fortsetzung von Blatt 2)

Art °	Kennzeichnung der Veröffentlichung, soweit erforderlich unter Angabe der maßgeblichen Teile	Betr. Anspruch Nr.
A	DE,A,1 935 499 (BADISCHE ANILIN- & SODA-FABRIK AG.) 14. Januar 1971 in der Anmeldung erwähnt siehe das ganze Dokument ---	1-10
A	DATABASE WPI Week 8921, Derwent Publications Ltd., London, GB; AN 89-153907 & JP,A,1 093 514 (NEW JAPAN CHEM.) 12. April 1989 siehe Zusammenfassung -----	1-10

ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.

EP 9300794
SA 72530

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentedokumente angegeben.

Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am
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08/07/93

Im Recherchenbericht angeführtes Patentedokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
WO-A-9117974	28-11-91	DE-A- 4015849	21-11-91
		AU-A- 7851591	10-12-91
		EP-A- 0528899	03-03-93
EP-A-0370675	30-05-90	JP-A- 2139480	29-05-90
		JP-B- 4028826	15-05-92
		CA-A- 2003324	21-05-90
		US-A- 5023003	11-06-91
DE-A-1935499	14-01-71	BE-A- 753296	11-01-71
		FR-A- 2054337	16-04-71
		NL-A- 7010103	14-01-71

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Für nähere Einzelheiten zu diesem Anhang : siehe Amtsblatt des Europäischen Patentamts, Nr.12/82

PCT

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁶ : C11D 1/62, 1/645, 3/20</p>	<p>A1</p>	<p>(11) International Publication Number: WO 97/34972</p> <p>(43) International Publication Date: 25 September 1997 (25.09.97)</p>						
<p>(21) International Application Number: PCT/US97/03374</p> <p>(22) International Filing Date: 5 March 1997 (05.03.97)</p> <p>(30) Priority Data:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">08/621,019</td> <td style="width: 40%;">22 March 1996 (22.03.96)</td> <td style="width: 30%;">US</td> </tr> <tr> <td>08/679,694</td> <td>11 July 1996 (11.07.96)</td> <td>US</td> </tr> </table> <p>(71) Applicant: THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).</p> <p>(72) Inventors: WAHL, Errol, Hoffman; 8021 Deersadow Lane, Cincinnati, OH 45242 (US). TRINH, Toan; 8671 Creekwood Lane, Maineville, OH 45039 (US). GOSSELINK, Eugene, Paul; 3754 Susanna Drive, Cincinnati, OH 45239 (US). LETTON, James, Carey; 1247 Jeremy Court, Cincinnati, OH 45240 (US). SIVIK, Mark, Robert; 40-F Clubhouse Lane, Fairfield, OH 45014 (US).</p> <p>(74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).</p>		08/621,019	22 March 1996 (22.03.96)	US	08/679,694	11 July 1996 (11.07.96)	US	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>
08/621,019	22 March 1996 (22.03.96)	US						
08/679,694	11 July 1996 (11.07.96)	US						
<p>(54) Title: FABRIC SOFTENING COMPOUND/COMPOSITION</p> <p>(57) Abstract</p> <p>Fabric softening actives having hydrophobic moieties containing, preferably, ester, or amide, linkages and mixed branched and unsaturated hydrophobic groups provide improved processing and stability as well as surprisingly good softening. Preferred compositions contain mono-ol and diol principal solvents having a ClogP of from about 0.15 to about 0.64, that have the ability to make clear aqueous fabric softener compositions containing relatively high concentrations of the said fabric softener actives having ester linkages in their long, hydrophobic chains. Other solvents may be present. Premixes of the fabric softening actives, the principal solvents, and, optionally, other solvents are useful in the preparation of complete formulations by obviating/limiting the need for heating. Other compositions can be prepared which are solid or dispersions of the said fabric softening actives.</p>								

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FABRIC SOFTENING COMPOUND/COMPOSITION

5

TECHNICAL FIELD

10 The present invention relates to fabric softening compounds and/or compositions preferably for use in formulating translucent, or, more preferably, clear, aqueous, concentrated, liquid softening compositions useful for softening cloth. It especially relates to fabric softening compounds and/or compositions suitable for formulating textile softening compositions for use in the rinse cycle of a textile laundering operation to
15 provide excellent fabric-softening/static-control benefits, the compositions being characterized by, e.g., reduced staining of fabric, excellent water dispersibility, rewettability, and/or storage and viscosity stability at sub-normal temperatures, i.e., temperatures below normal room temperature, e.g., 25°C.

BACKGROUND OF THE INVENTION

20 The art discloses clear, concentrated fabric conditioning formulations. For example, European Patent Application No. 404,471, Machin et al., published Dec. 27, 1990, teaches isotropic liquid softening compositions with at least 20% by weight softener and at least 5% by weight of a short chain organic acid.

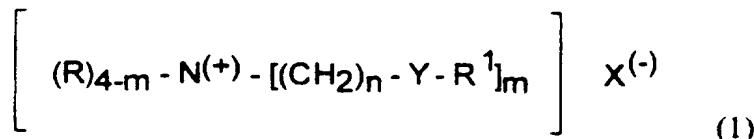
The present invention provides fabric softener actives suitable for formulating
25 e.g., concentrated, preferably clear, preferably aqueous, liquid textile treatment compositions, preferably with low organic solvent level (i.e., below about 40%, by weight of the composition), that have improved stability (i.e., remain clear or translucent and do not precipitate, gel, thicken, or solidify) at normal, i.e., room temperatures and sub-normal temperatures under prolonged storage conditions. Said compositions also provide
30 reduced staining of fabrics, good cold water dispersibility, together with excellent softening, anti-static and fabric rewettability characteristics, as well as reduced dispenser residue buildup and excellent freeze-thaw recovery. However, in order to formulate such compositions, a fabric softener active is required with a relatively fluid nature. Such fabric softener actives can be prepared by using highly unsaturated materials, but there are
35 many problems associated with such materials, including the fact that they are subject to chemical instability and normally are not as effective as saturated materials for softening.

SUMMARY OF THE INVENTION

Fabric softener actives for use herein are biodegradable, and contain ester linkages in the long hydrophobic chains. They contain both branched and unsaturated acyl chains. Specifically, the actives preferably have the formulas:

5

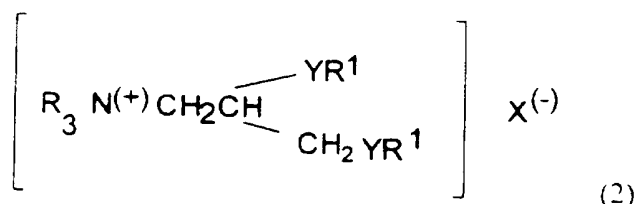
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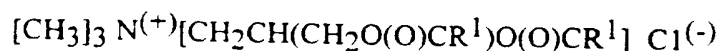
wherein each R substituent is hydrogen or a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or mixtures thereof; each m is 2 or 3, preferably 2; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, preferably -O-(O)C-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C- ("YR¹ sum"), is C₆-C₂₂, preferably C₁₂-22, more preferably C₁₄-C₂₀, (hereinafter, R¹ and YR¹ are used interchangeably to represent the hydrophobic chain, the R¹ chain lengths in general being even numbered for fatty alcohols and odd for fatty acids), but no more than one YR¹ sum being less than about 12 and then the other R¹, or YR¹, sum is at least about 16, with each R¹ comprising a long chain C₅-C₂₁ (or C₆-C₂₂), preferably C₁₀-C₂₀ (or C₉-C₁₉) branched alkyl or unsaturated alkyl, most preferably C₁₂-C₁₈ (or C₁₁-C₁₇) branched alkyl, or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 95:5 to about 5:95, preferably from about 75:25 to about 25:75, more preferably from about 50:50 to about 30:70, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115 (As used herein, the "branched alkyl" groups include those that contain a substituent that is hydrophobic, even though they are attached to the main chain by bonds that are not carbon to carbon, e.g., by oxygen, as in the alkoxy substituents, and the Iodine Value of a "parent" fatty acid, or "corresponding" fatty acid, is used to define a level of unsaturation for an R¹ groups that is the same as the level of unsaturation that would be present in a fatty acid containing the same R¹ group. When an individual R¹ is both branched and unsaturated, it is treated as if it is branched.); and wherein the counterion, X⁻, can be any softener-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and/or nitrate, more preferably chloride;

3

2. softener having the formula:



- 5 wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before (Such compounds include those having the formula:

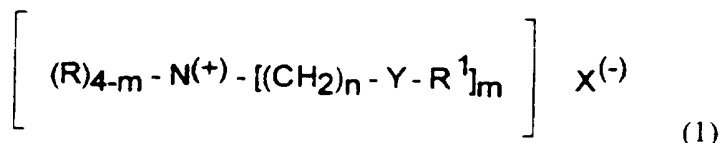


- 10 where -O-(O)CR¹ is derived partly from unsaturated, e.g., oleic, fatty acid and, preferably, each R is a methyl or ethyl group and preferably each R¹ is in the range of C₁₅ to C₁₉ with degrees of branching and substitution being present in the alkyl chains and partly from a branched chain fatty acid like isostearic acid); and
3. mixtures thereof.

15

The compositions herein preferably comprise:

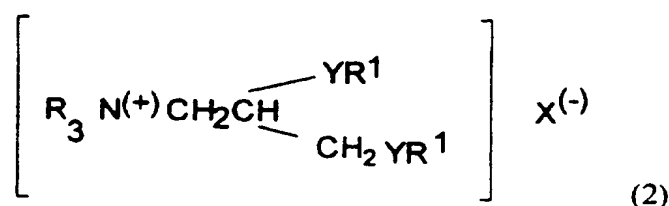
- A. from about 2% to about 80%, preferably from about 13% to about 75%, more preferably from about 15% to about 70%, and even more preferably from about 19% to about 65%, by weight of the composition, of biodegradable fabric softener active selected
- 20 from the group consisting of:
1. softener active having the formula:



- 25 wherein each R substituent is hydrogen or a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or mixtures thereof; each m is 2 or 3, preferably 2; each n is from 1 to about 4; preferably 2, each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, preferably -O-(O)C-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C-, is
- 30 C₆-C₂₂, preferably C₁₂-C₂₂, more preferably C₁₄-C₂₀, but no more than one R¹, or YR¹,

sum being less than about 12 and then the other R^1 , or YR^1 , sum is at least about 16, with each R^1 being a long chain C_5 - C_{21} (or C_6 - C_{22}), preferably C_9 - C_{19} (or C_{10} - C_{20}), or more preferably C_{11} - C_{17} , (or C_{12} - C_{18}) branched alkyl and unsaturated alkyl (e.g., alkenyl, also referred to sometimes as "alkylene", and including polyunsaturated alkyl), the ratio of branched alkyl to unsaturated alkyl being from about 5:95 to about 95:5, preferably from about 75:25 to about 25:75, more preferably from about 50:50 to about 30:70, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R^1 group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115; and wherein the counterion, X^- , can be any softener-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and/or nitrate, more preferably chloride;

2. softener active having the formula:



wherein each Y, R, R^1 , and $X^{(-)}$ have the same meanings as before; and

3. mixtures thereof.

[In one preferred biodegradable quaternary ammonium fabric softening compound, $C(O)R^1$ is derived partly from unsaturated fatty acid, e.g., oleic acid, and/or fatty acids and/or partially hydrogenated fatty acids, derived from vegetable oils and/or partially hydrogenated vegetable oils, such as: canola oil; safflower oil; peanut oil; sunflower oil; soybean oil; corn oil; tall oil; rice bran oil; etc. and partly from a branched chain fatty acid like isostearic acid.] [As used hereinafter, these biodegradable fabric softener actives containing ester linkages are referred to as "DEQA", which includes both diester, triester, and monoester compounds containing from one to three, preferably two, long chain hydrophobic groups. The corresponding amide softener actives and the mixed ester-amide softener actives can also contain from one to three, preferably two, long chain hydrophobic groups.]

B. optionally, but preferably, the compositions can also contain less than about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, by weight of the composition of principal solvent having a ClogP of from about 0.15 to about 0.64, preferably from about

0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, said principal solvent preferably containing insufficient amounts of solvents selected from the group consisting of: 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethylhexyl-1,3-diol, and mixtures thereof, when used alone, to provide a clear product, preferably insufficient to provide a stable product, more preferably insufficient to provide a detectable change in the physical characteristics of the composition, and especially completely free thereof, and the principal solvent preferably being selected from the group disclosed hereinafter;

5 C. optionally, but preferably, an effective amount, sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate, etc., said water soluble solvents being at a level that will not form clear compositions by themselves;

10 D. optionally, but preferably, an effective amount to improve clarity, of water soluble calcium and/or magnesium salt, preferably chloride; and

15 E. the balance being water.

Preferably, the compositions herein are aqueous, translucent or clear, preferably clear, compositions containing from about 3% to about 95%, preferably from about 10% to about 80%, more preferably from about 30% to about 70%, and even more preferably from about 40% to about 60%, water and from about 3% to about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, of the above principal alcohol solvent B. These preferred products (compositions) are not translucent, or clear, without principal solvent B. The amount of principal solvent B. required to make the compositions translucent, or clear, is preferably more than 50%, more preferably more than about 60%, and even more preferably more than about 75%, of the total organic solvent present.

25 The compositions can also be prepared as conventional dispersions of the fabric softener active containing from about 2% to about 50%, preferably from about 10% to about 40%, more preferably from about 15% to about 30%, of the fabric softener active. The compositions can also be prepared as solids, either granular, or attached to substrates, as disclosed hereinafter.

30 The pH of the aqueous compositions should be from about 1 to about 7, preferably from about 1.5 to about 5, more preferably from about 2 to about 3.5.

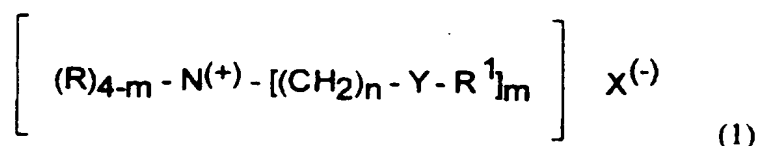
DETAILED DESCRIPTION OF THE INVENTION

I. FABRIC SOFTENING ACTIVE

The present invention relates to fabric softening actives and compositions containing, as an essential component, from about 2% to about 80%, preferably from about 13% to about 75%, more preferably from about 15% to about 70%, and even more preferably from about 19% to about 65%, by weight of the composition, of said fabric softener actives, said fabric softener actives being selected from the compounds identified hereinafter, and mixtures thereof.

(A) Diester Quaternary Ammonium Fabric Softening Active Compound (DEQA)

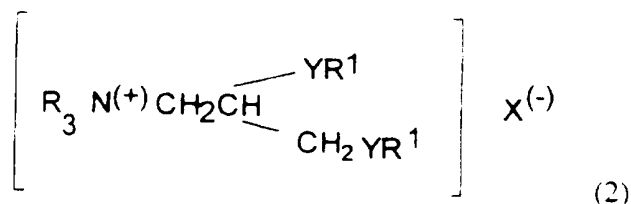
(1) The first type of DEQA preferably comprises, as the principal active, compounds of the formula



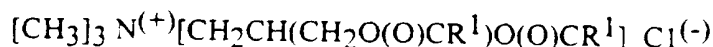
wherein each R substituent is hydrogen or a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, preferably -O-(O)C-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C-, is C₆-C₂₂, preferably C₁₂-C₂₂, more preferably C₁₄-C₂₀, but no more than one R¹, or YR¹, sum being less than about 12 and then the other R¹, or YR¹, sum is at least about 16, with each R¹ being a long chain C₅-C₂₁ (or C₆-C₂₂), preferably C₉-C₁₉ (or C₉-C₂₀), most preferably C₁₁-C₁₇ (or C₁₂-C₁₈), branched alkyl and unsaturated alkyl (including polyunsaturated alkyl), the ratio of branched alkyl to unsaturated alkyl being from about 5:95 to about 95:5, preferably from about 75:25 to about 25:75, more preferably from about 50:50 to about 30:70, especially 35:65, and for the unsaturated alkyl group, the Iodine Value of R¹ of the parent fatty acid of this R¹ group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115; and wherein the counterion, X⁻, can be any softener-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and/or nitrate, more preferably chloride;

2. softener having the formula:

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wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before (Such compounds include those having the formula:



where -O(O)CR¹ is derived partly from unsaturated, e.g., oleic, fatty acid and, preferably, each R is a methyl or ethyl group and preferably each R¹ is in the range of C₁₅ to C₁₉ with degrees of branching and substitution being present in the alkyl chains and partly from a branched chain fatty acid like isostearic acid); and

3. mixtures thereof.

The counterion, X⁽⁻⁾ above, can be any softener-compatible anion, preferably the anion of a strong acid, for example, chloride, bromide, methylsulfate, ethylsulfate, sulfate, nitrate and the like, more preferably chloride. The anion can also, but less preferably, carry a double charge in which case X⁽⁻⁾ represents half a group.

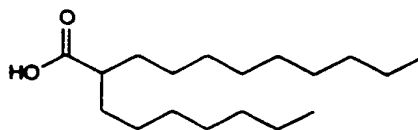
The fabric softener active can comprise mixtures of compounds containing, respectively, branched and unsaturated compounds. Preferred biodegradable quaternary ammonium fabric softening compounds useful in preparing such mixtures can contain the group -O-(O)CR¹ which is derived from unsaturated, and polyunsaturated, fatty acids, e.g., oleic acid, and/or partially hydrogenated fatty acids, derived from vegetable oils and/or partially hydrogenated vegetable oils, such as, canola oil, safflower oil, peanut oil, sunflower oil, corn oil, soybean oil, tall oil, rice bran oil, etc. Mixtures of unsaturated fatty acids, and mixtures of DEQAs that are derived from different unsaturated fatty acids can be used, and are preferred. Non-limiting examples of DEQAs prepared from preferred unsaturated fatty acids are disclosed hereinafter as DEQA¹ to DEQA⁸.

DEQA⁶ is prepared from a soy bean fatty acid, DEQA⁷ is prepared from a slightly hydrogenated tallow fatty acid, and DEQA⁸ is prepared from slightly hydrogenated canola fatty acids.

DEQAs prepared with R¹ groups that contain branched chains, e.g., from isostearic acid, for at least part of the R¹ groups comprise the other part of the mixture. It is also preferred that the fabric softener active itself comprise compounds containing mixed branched-chain and unsaturated R¹ groups. The total of active represented by the branched chain groups is typically from about 5% to about 95%, preferably from about 25% to about 75%, more preferably from about 35% to about 50%.

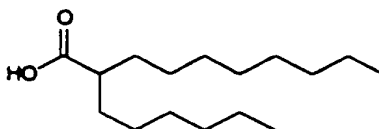
Suitable branched chain fatty acids that can be used to prepare branched, or mixed branched alkyl and unsaturated alkyl DEQAs, can be prepared by a variety of methods. The corresponding branched chain fatty alcohols can be prepared by reduction of the branched chain fatty acids by standard reactions, e.g., using borane-THF after the method of Brown, J. Amer. Chem. Soc. (1970), 92, 1637, incorporated herein by reference. The following are non-limiting examples of branched chain fatty acids.

Branched Chain Fatty Acid 1: 2-n-Heptylundecanoic Acid



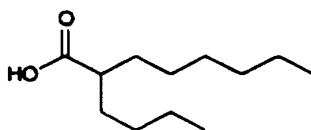
2-n-Heptylundecanoic acid [22890-21-7] is available from TCI America, catalog number IO281. It can be made by oxidizing the Guerbet alcohol 2-heptylundecanol which is, in turn, the aldol condensation product of nonanal. Guerbet alcohols are available commercially from Condea under the trade name ISOFOL[®] Alcohols.

Branched Chain Fatty Acid 2: 2-n-Hexyldecanoic Acid



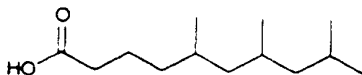
2-n-Heptylundecanoic acid [25354-97-6] is available from TCI America, catalog number H0507. It can be made by oxidizing the Guerbet alcohol 2-hexyldecanol which is, in turn, the aldol condensation product of octanal.

Branched Chain Fatty Acid 3: 2-n-Butyloctanoic Acid



2-*n*-Butyloctanoic Acid is available from Union Carbide under the trade name ISOCARB® 12 Acid. It can be made by oxidizing the Guerbet alcohol 2-butyloctanol.

Branched Chain Fatty Acid 4: 5,7,9-Trimethylnonanoic Acid



5,7,9-Trimethylnonanoic acid and 3,5,7,9-tetramethylnonanoic acid are made by the Union Camp Corporation using the oxo process described by N. E. Lawson, et. al. in *J. Am. Oil. Chem. Soc.* **1981**, 58, 59.

Branched Chain Fatty Acid 5: Alpha-alkylated Carboxylic Acids



Alpha substituted acids can be prepared by the C-alkylation of an enamine which is derived from a straight chained aldehyde such as octanal or decanal. The derived enamine will form the carbanion on the carbon alpha to the terminal nitrogen. Reaction of the enamine anion with an alkyl bromide, in the presence of a catalytic amount of NaI, will give the branched chain enamine which upon hydrolysis gives the alpha alkylated aldehyde. The aldehyde can then be oxidized to the corresponding carboxylic acid.

Alpha-heptyldecanoic acid

Decanal (aldehyde) can be reacted with an excess of a cyclic amine such as pyrrolidine, by heating at reflux in toluene in the presence of a trace amount of p-toluene sulfonic acid. As the amine condenses with the aldehyde, water is formed and can be removed by reflux through a water trap. After the theoretical amount of water has been removed, heptylbromide and sodium iodide can be added and the alkylation completed in the same solvent system. Following alkylation (overnight), the reaction mixture is poured over ice and made acidic with 20% HCl. This hydrolysis converts the alkylated enamine to the alpha-heptyl decanal. The product can be isolated by separation, washing, then drying, of the solvent layer and subsequent removal of the solvent by vacuum distillation.

The isolated branched aldehyde can then be converted to the desired carboxylic acid by oxidation in an appropriate solvent system. Examples of oxidizing agents are; aqueous potassium permanganate; The Jones Reagent (CrO₃/H₂SO₄/H₂O) in acetone; CrO₃-acetic acid, etc. Separation of the desired alpha-heptyldecanoic acid from the oxidizing medium will be facilitated by the high molecular weight of the acid.

Branched Chain Fatty Acid 6: 9- and 10-Alkoxyoctadecanoic Acids, Other Positional Isomers, and the Corresponding Alkoxyoctadecanols.

9- and 10-Methoxyoctadecanoic Acids. The method of Siouffi et. al. described in Chemistry and Physics of Lipids, (1972), 8(2), 91-101 is followed. About 5 g portion of methyl oleate is dissolved in about 8 g of methanol and treated with tert-butyl hypobromite to give the mixed methoxybromo derivatives. These are isolated and debrominated with Rany catalyst and the crude acid is isolated after acidification. Hydrogenation of olefinic components in the crude acid is conducted in cyclohexane using platinum oxide. This produces the crude mixture of the desired 9- and 10-methoxyoctadecanoic acids.

9- and 10-Isopropoxyoctadecanoic Acids. The same procedure is used except that 2-propanol is substituted for methanol in the bromination step. This yields the desired 9- and 10-isopropoxyoctadecanoic acids.

Positional Isomers of Alkoxyoctadecanoic Acids: The same procedure is used except that oleic acid is first isomerized to a mixture of unsaturated acids by heating with methanesulfonic acid. The alkoxybromination-reduction sequence in this case leads to mixtures of additional positional isomers of alkoxyoctadecanoic acids.

Corresponding Fatty Alcohols. The substituted octadecanoic acids are reduced to the corresponding octadecanols using borane-THF after the method of Brown, J. Amer. Chem. Soc. (1970), 92, 1637.

Branched Chain Fatty Acid 7: Phenyl octadecanoic Acid, Alkylphenyl octadecanoic Acid, and the Corresponding Octadecanols.

Phenyl octadecanoic Acid. The method of Nakano and Foglia described in The Journal of the American Oil Chemists Society, (1984), 61(3), 569-73 is used. About 5 g portion of oleic acid and about 6.91 g of benzene are treated dropwise with about 10.2 g of methanesulfonic acid at about 50C° and then allowed to stir for about 6 hours. The reaction mixture is added to water and extracted with diethyl ether. Removal of the solvents by vacuum stripping gives the crude mixture of positional isomers of phenyl octadecanoic acid.

Methylphenyl octadecanoic Acid. The synthesis is repeated but with toluene instead of benzene to yield the mixed positional isomers of methylphenyl octadecanoic acid.

Corresponding Octadecanols. The substituted octadecanoic acids are reduced to the corresponding octadecanols using borane-THF after the method of Brown, J. Amer. Chem. Soc. (1970), 92, 1637.

Branched Chain Fatty Acid 8: Phenoxyoctadecanoic Acid, Hydroxyphenyl octadecanoic Acid, and the Corresponding Octadecanols.

Hydroxyphenyloctadecanoic Acids. The method of Nakano and Foglia described in The Journal of the American Oil Chemists Society, (1984).61(3), 569-73 is used. About 1:5:6 mole ratio of oleic acid, phenol, and methanesulfonic acid are allowed to react at about 25C° for about 48 hours. The reaction mixture is added to water and
5 extracted with ether. The extract is stripped of solvent and phenol to give the desired crude mixed positional isomers of hydroxyphenyloctadecanoic acid.

Phenoxyoctadecanoic Acids. The reaction is repeated with about 1:5:2 mole ratio of oleic acid, phenol, and methanesulfonic acid. The isolated crude product is predominantly phenoxyoctadecanoic acid, but also contains hydroxyphenyloctadecanoic
10 acid. A purified mixture of phenoxyoctadecanoic acid positional isomers is obtained by chromatography.

Corresponding Octadecanols. The substituted octadecanoic acids are reduced to the corresponding octadecanols using borane-THF after the method of Brown, J. Amer. Chem. Soc. (1970), 92, 1637.

15 **Branched Chain Fatty Acids 9: Isostearic Acids.**

Isostearic acids are produced from the monomeric acids obtained in the dimerization of unsaturated C₁₈ fatty acids, according to U.S. Pat. No. 2,812,342, issued Nov. 5, 1957 to R. M. Peters, incorporated herein by reference.

Suitable branched fabric softening actives which can be mixed with the above
20 described unsaturated fabric softening actives (DEQAs) to form the fabric softening actives of this invention can be formed using the above branched chain fatty acids, and/or the corresponding branched chain fatty alcohols. Similarly, the branched chain fatty acids and/or alcohols can be used with unsaturated fatty acids and/or alcohols to form suitable mixed chain actives. Specific examples of DEQAs containing branched chains disclosed
25 hereinafter as DEQA¹⁰-DEQA²⁵ can be blended with unsaturated DEQAs. DEQA¹⁰ . DEQA¹² are prepared from different commercially available isostearic acids.

As disclosed hereinbefore, other preferred DEQA's are those that are prepared as a single DEQA from blends of all the different branched and unsaturated fatty acids that are represented (total fatty acid blend), rather than from blends of mixtures of separate
30 finished DEQA's that are prepared from different portions of the total fatty acid blend.

It is preferred that at least a substantial percentage of the fatty acyl groups are unsaturated, e.g., from about 25% to 70%, preferably from about 50% to about 65%. Polyunsaturated fatty acid groups can be used. The total level of active containing polyunsaturated fatty acyl groups (TPU) can be from about 3% to about 30%, preferably
35 from about 5% to about 25%, more preferably from about 10% to about 18%. Both cis

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and trans isomers can be used, preferably with a cis/trans ratio of from 1:1 to about 50:1, the minimum being 1:1, preferably at least 3:1, and more preferably from about 4:1 to about 20:1. (As used herein, the "percent of softener active" containing a given R¹ group is the same as the percentage of that same R¹ group is to the total R¹ groups used to form all of the softener actives.)

The unsaturated, including the polyunsaturated, fatty acyl groups, discussed hereinbefore and hereinafter, surprisingly provide effective softening when used with the branched chain fatty acyl groups, and also provide good rewetting characteristics, good antistatic characteristics, and especially, superior recovery after freezing and thawing.

The mixed branched-chain and unsaturated materials are easier to formulate than conventional saturated straight chain fabric softener actives. They can be used to form concentrated premixes that maintain their low viscosity and are therefore easier to process, e.g., pump, mix, etc. These materials with only the low amount of solvent that normally is associated with such materials, i.e., from about 5% to about 20%, preferably from about 8% to about 25%, more preferably from about 10% to about 20%, weight of the total softener/solvent mixture, are also easier to formulate into concentrated, stable compositions of the present invention, even at ambient temperatures. This ability to process the actives at low temperatures is especially important for the polyunsaturated groups, since it minimizes degradation. Additional protection against degradation can be provided when the compounds and softener compositions contain effective antioxidants, chelants, and/or reducing agents, as disclosed hereinafter. The use of branched chain fatty acyl groups improves the resistance to degradation while maintaining fluidity and improving softening.

The present invention can also contain some medium-chain biodegradable quaternary ammonium fabric softening compound, DEQA, having the above formula (1) and/or formula (2), below, wherein:

each Y is -O-(O)C-, or -C(O)-O-, preferably -O-(O)C-;

m is 2 or 3, preferably 2;

each n is 1 to 4, preferably 2;

each R substituent is a C₁-C₆ alkyl, preferably a methyl, ethyl, propyl, benzyl groups and mixtures thereof, more preferably a C₁-C₃ alkyl group;

each R¹, or YR¹, is a saturated C₈-C₁₄, preferably a C₁₂₋₁₄ hydrophobic group comprising hydrocarbyl, or substituted hydrocarbyl substituent (the IV is preferably about 10 or less, more preferably less than about 5), (The sum of the carbons in the

acyl group, R^1+1 , when Y is $-O-(O)C-$ or $-(R)N-(O)C-$ and the counterion, X^- , is the same as above. Preferably X^- does not include phosphate salts.

The saturated C_8 - C_{14} fatty acyl groups can be pure derivatives, or can be mixed chain lengths.

5 Suitable fatty acid sources for said fatty acyl groups are coco, lauric, caprylic, and capric acids.

For C_{12} - C_{14} (or C_{11} - C_{13}) hydrocarbonyl groups, the groups are preferably saturated, e.g., the IV is preferably less than about 10, preferably less than about 5.

10 It will be understood that the branched R^1 substituents can contain various groups such as alkoxyl groups which act as branching, and a small percentage can be straight, so long as the R^1 groups maintain their basically hydrophobic character. The preferred compounds can be considered to be biodegradable diester variations of hardened ditallow dimethyl ammonium chloride (hereinafter referred to as "DTDMAC"), which is a widely used fabric softener.

15 As used herein, when the diester is specified, it can include the monoester that is present. Preferably, at least about 80% of the DEQA is in the diester form, and from 0% to about 20% can be DEQA monoester, e.g., one YR^1 group is either $-OH$, or $-C(O)OH$, and, for Formula 1., m is 2. The corresponding diamide and/or mixed ester-amide can also include the active with one long chain hydrophobic group, e.g., one YR^1 group is
20 either $-N(R)H$, or $-C(O)OH$. In the following, any disclosure, e.g., levels, for the monoester actives is also applicable to the monoamide actives. For softening, under no/low detergent carry-over laundry conditions the percentage of monoester should be as low as possible, preferably no more than about 5%. However, under high, anionic detergent surfactant or detergent builder carry-over conditions, some monoester can be
25 preferred. The overall ratios of diester to monoester are from about 100:1 to about 2:1, preferably from about 50:1 to about 5:1, more preferably from about 13:1 to about 8:1. Under high detergent carry-over conditions, the di/mmonoester ratio is preferably about 11:1. The level of monoester present can be controlled in manufacturing the DEQA.

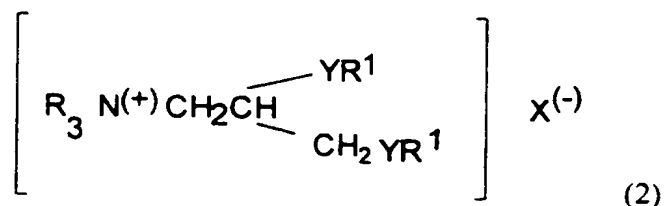
30 The above compounds, as exemplified hereinafter, used as the biodegradable quaternized ester-amine softening material in the practice of this invention, can be prepared using standard reaction chemistry. In one synthesis of a di-ester variation of DTDMAC, an amine of the formula $RN(CH_2CH_2OH)_2$ is esterified at both hydroxyl groups with an acid chloride of the formula $R^1C(O)Cl$, to form an amine which can be made cationic by acidification (one R is H) to be one type of softener, or then quaternized
35 with an alkyl halide, RX , to yield the desired reaction product (wherein R and R^1 are as

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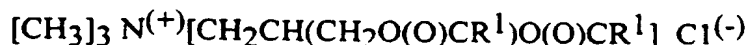
defined hereinbefore). However, it will be appreciated by those skilled in the chemical arts that this reaction sequence allows a broad selection of agents to be prepared.

Yet another DEQA softener active that is suitable for the formulation of the fabric softening actives and concentrated, clear liquid fabric softener compositions of the present invention has the above formula (1) wherein one R group is a C₁₋₄ hydroxy alkyl group, preferably one wherein one R group is a hydroxyethyl group.

(2) The second type of DEQA active has the general formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before. Such compounds include those having the formula:



where each R is a methyl or ethyl group and preferably each R¹ is in the range of C₁₅ to C₁₉. Degrees of substitution can be present in the alkyl or unsaturated alkyl chains. The anion X⁽⁻⁾ in the molecule is the same as in DEQA (1) above. As used herein, when the diester is specified, it can include the monoester that is present. The amount of monoester that can be present is the same as in DEQA (1). An example of a preferred DEQA of formula (2) is the "propyl" ester quaternary ammonium fabric softener active having the formula 1,2-di(acyloxy)-3-trimethylammoniopropane chloride, wherein the acyl group is the same as that of DEQA⁵, exemplified hereinafter as DEQA⁹.

These types of agents and general methods of making them are disclosed in U.S. Pat. No. 4,137,180, Naik et al., issued Jan. 30, 1979, which is incorporated herein by reference..

In suitable softener actives (1) and (2), each R¹ is a branched alkyl, monounsaturated unsaturated alkyl, or polyunsaturated alkyl group; the actives containing mixtures of branched alkyl and unsaturated alkyl R¹ groups, especially within the individual molecules, in the ratios disclosed hereinbefore.

The DEQAs herein can contain a low level of fatty acid, which can be from unreacted starting material used to form the DEQA and/or as a by-product of any partial

degradation (hydrolysis) of the softener active in the finished composition. It is preferred that the level of free fatty acid be low, preferably below about 10%, and more preferably below about 5%, by weight of the softener active.

II. OPIONAL, BUT PREFERRED, PRINCIPAL SOLVENT SYSTEM

5 The compositions of the present invention preferably comprise less than about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, of the principal solvent, by weight of the composition. Said principal solvent is selected to minimize solvent odor
10 impact in the composition and to provide a low viscosity to the final composition. For example, isopropyl alcohol is not very effective and has a strong odor. n-Propyl alcohol is more effective, but also has a distinct odor. Several butyl alcohols also have odors but can be used for effective clarity/stability, especially when used as part of a principal solvent system to minimize their odor. The alcohols are also selected for optimum low temperature stability, that is they are able to form compositions that are liquid with
15 acceptable low viscosities and translucent, preferably clear, down to about 40°F (about 4.4°C) and are able to recover after storage down to about 20°F (about 6.7°C).

The principal solvents are desirably kept to the lowest levels that are feasible in the present compositions for obtaining translucency or clarity. The presence of water exerts an important effect on the need for the principal solvents to achieve clarity of these
20 compositions. The higher the water content, the higher the principal solvent level (relative to the softener level) is needed to attain product clarity. Inversely, the less the water content, the less principal solvent (relative to the softener) is needed. Thus, at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is preferably from about 55:45 to about 85:15, more preferably from about
25 60:40 to about 80:20. At water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is preferably from about 45:55 to about 70:30, more preferably from about 55:45 to about 70:30. But at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is preferably from about 30:70 to about 55:45, more preferably from about 35:65 to about 45:55. At even
30 higher water levels, the softener to principal solvent ratios should also be even higher.

The suitability of any principal solvent for the formulation of the liquid, concentrated, preferably clear, fabric softener compositions herein with the requisite stability is surprisingly selective. Suitable solvents can be selected based upon their octanol/water partition coefficient (P). Octanol/water partition coefficient of a principal
35 solvent is the ratio between its equilibrium concentration in octanol and in water. The

partition coefficients of the principal solvent ingredients of this invention are conveniently given in the form of their logarithm to the base 10, logP.

The logP of many ingredients has been reported; for example, the Pomona92 database, available from Daylight Chemical Information Systems, Inc. (Daylight CIS), Irvine, California, contains many, along with citations to the original literature. However, the logP values are most conveniently calculated by the "CLOGP" program, also available from Daylight CIS. This program also lists experimental logP values when they are available in the Pomona92 database. The "calculated logP" (ClogP) is determined by the fragment approach of Hansch and Leo (cf., A. Leo, in *Comprehensive Medicinal Chemistry*, Vol. 4, C. Hansch, P. G. Sammens, J. B. Taylor and C. A. Ramsden, Eds., p. 295, Pergamon Press, 1990, incorporated herein by reference). The fragment approach is based on the chemical structure of each ingredient, and takes into account the numbers and types of atoms, the atom connectivity, and chemical bonding. These ClogP values, which are the most reliable and widely used estimates for this physicochemical property, are preferably used instead of the experimental logP values in the selection of the principal solvent ingredients which are useful in the present invention. Other methods that can be used to compute ClogP include, e.g., Crippen's fragmentation method as disclosed in *J. Chem. Inf. Comput. Sci.*, 27, 21 (1987); Viswanadhan's fragmentation method as disclosed in *J. Chem. Inf. Comput. Sci.*, 29, 163 (1989); and Broto's method as disclosed in *Eur. J. Med. Chem. - Chim. Theor.*, 19, 71 (1984). The principal solvents herein are selected from those having a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, said principal solvent preferably being at least somewhat asymmetric, and preferably having a melting, or solidification, point that allows it to be liquid at, or near room temperature. Solvents that have a low molecular weight and are biodegradable are also desirable for some purposes. The more asymmetric solvents appear to be very desirable, whereas the highly symmetrical solvents such as 1,7-heptanediol, or 1,4-bis(hydroxymethyl) cyclohexane, which have a center of symmetry, appear to be unable to provide the essential clear compositions when used alone, even though their ClogP values fall in the preferred range.

The most preferred principal solvents can be identified by the appearance of the softener vesicles, as observed via cryogenic electron microscopy of the compositions that have been diluted to the concentration used in the rinse. These dilute compositions appear to have dispersions of fabric softener that exhibit a more unilamellar appearance than conventional fabric softener compositions. The closer to uni-lamellar the

appearance, the better the compositions seem to perform. These compositions provide surprisingly good fabric softening as compared to similar compositions prepared in the conventional way with the same fabric softener active. The compositions also inherently provide improved perfume deposition as compared to conventional fabric softening compositions, especially when the perfume is added to the compositions at, or near, room temperature.

Operable principal solvents are listed below under various listings, e.g., aliphatic and/or alicyclic diols with a given number of carbon atoms; monols; derivatives of glycerine; alkoxylates of diols; and mixtures of all of the above. The preferred principal solvents are in italics and the most preferred principal solvents are in bold type. The reference numbers are the Chemical Abstracts Service Registry numbers (CAS No.) for those compounds that have such a number. Novel compounds have a method identified, described hereinafter, that can be used to prepare the compounds. Some inoperable principal solvents are also listed below for comparison purposes. The inoperable principal solvents, however, can be used in mixtures with operable principal solvents. Operable principal solvents can be used to make concentrated fabric softener compositions that meet the stability/clarity requirements set forth herein.

Many diol principal solvents that have the same chemical formula can exist as many stereoisomers and/or optical isomers. Each isomer is normally assigned with a different CAS No. For examples, different isomers of 4-methyl-2,3-hexanediol are assigned to at least the following CAS Nos: 146452-51-9; 146452-50-8; 146452-49-5; 146452-48-4; 123807-34-1; 123807-33-0; 123807-32-9; and 123807-31-8.

In the following listings, for simplicity, each chemical formula is listed with only one CAS No. This disclosure is only for exemplification and is sufficient to allow the practice of the invention. The disclosure is not limiting. Therefore, it is understood that other isomers with other CAS Nos, and their mixtures, are also included. By the same token, when a CAS No. represents a molecule which contains some particular isotopes, e.g., deuterium, tritium, carbon-13, etc., it is understood that materials which contain naturally distributed isotopes are also included, and vice versa.

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TABLE I
MONO-OLS

5	<i>n</i> -propanol	<u>CAS No.</u> 71-23-8
	2-butanol 2-methyl-2-propanol	<u>CAS No.</u> 15892-23-6 75-65-0
10	<u>Inoperable Isomer</u>	
	2-methyl-1-propanol	78-83-1

TABLE II
C6 DIOLS

15	<u>Operable Isomers</u>	<u>CAS No.</u>
20	2,3-butanediol, 2,3-dimethyl-	76-09-5
	<i>1,2-butanediol, 2,3-dimethyl-</i>	66553-15-9
	<i>1,2-butanediol, 3,3-dimethyl-</i>	59562-82-2
	<i>2,3-pentanediol, 2-methyl-</i>	7795-80-4
	<i>2,3-pentanediol, 3-methyl-</i>	63521-37-9
25	<i>2,3-pentanediol, 4-methyl-</i>	7795-79-1
	<i>2,3-hexanediol</i>	617-30-1
	<i>3,4-hexanediol</i>	922-17-8
30	1,2-butanediol, 2-ethyl-	66553-16-0
	1,2-pentanediol, 2-methyl-	20667-05-4
	1,2-pentanediol, 3-methyl-	159623-53-7
	1,2-pentanediol, 4-methyl-	72110-08-8
	1,2-hexanediol	6920-22-5
35	<u>Inoperable Isomers</u>	
40	1,3-propanediol, 2-ethyl-2-methyl-	
	1,3-propanediol, 2-isopropyl-	
	1,3-propanediol, 2-propyl-	
	1,3-butanediol, 2,2-dimethyl-	
	1,3-butanediol, 2,3-dimethyl-	
	1,3-butanediol, 2-ethyl-	
	1,4-butanediol, 2,2-dimethyl-	
	1,4-butanediol, 2,3-dimethyl-	

- 1.4-butanediol, 2-ethyl-
- 1.3-pentanediol, 2-methyl-
- 1.3-pentanediol, 3-methyl-
- 1.3-pentanediol, 4-methyl-
- 5 1.4-pentanediol, 2-methyl-
- 1.4-pentanediol, 3-methyl-
- 1.4-pentanediol, 4-methyl-
- 1.5-pentanediol, 2-methyl-
- 1.5-pentanediol, 3-methyl-
- 10 2.4-pentanediol, 2-methyl-
- 2.4-pentanediol, 3-methyl-
- 1.3-hexanediol
- 1.4-hexanediol
- 1.5-hexanediol
- 15 1.6-hexanediol
- 2.4-hexanediol
- 2.5-hexanediol

TABLE III
C7 DIOLS

	<u>Operable Isomers</u>	<u>CAS No.</u>
5	1,3-propanediol, 2-butyl-	2612-26-2
	1,3-propanediol, 2,2-diethyl-	115-76-4
	1,3-propanediol, 2-(1-methylpropyl)-	33673-01-7
	1,3-propanediol, 2-(2-methylpropyl)-	26462-20-8
10	1,3-propanediol, 2-methyl-2-propyl-	78-26-2
	1,2-butanediol, 2,3,3-trimethyl-	Method B
	1,4-butanediol, 2-ethyl-2-methyl-	76651-98-4
	1,4-butanediol, 2-ethyl-3-methyl-	66225-34-1
	1,4-butanediol, 2-propyl-	62946-68-3
15	1,4-butanediol, 2-isopropyl-	39497-66-0
	1,5-pentanediol, 2,2-dimethyl-	3121-82-2
	1,5-pentanediol, 2,3-dimethyl-	81554-20-3
	1,5-pentanediol, 2,4-dimethyl-	2121-69-9
	1,5-pentanediol, 3,3-dimethyl-	53120-74-4
20	2,3-pentanediol, 2,3-dimethyl-	6931-70-0
	2,3-pentanediol, 2,4-dimethyl-	66225-53-4
	2,3-pentanediol, 3,4-dimethyl-	37164-04-8
	2,3-pentanediol, 4,4-dimethyl-	89851-45-6
	3,4-pentanediol, 2,3-dimethyl-	Method B
25	1,5-pentanediol, 2-ethyl-	14189-13-0
	1,6-hexanediol, 2-methyl-	25258-92-8
	1,6-hexanediol, 3-methyl-	4089-71-8
	2,3-hexanediol, 2-methyl-	59215-55-3
	2,3-hexanediol, 3-methyl-	139093-40-6
30	2,3-hexanediol, 4-methyl-	***
	2,3-hexanediol, 5-methyl-	Method B
	3,4-hexanediol, 2-methyl-	Method B
	3,4-hexanediol, 3-methyl-	18938-47-1
	1,3-heptanediol	23433-04-7
35	1,4-heptanediol	40646-07-9
	1,5-heptanediol	60096-09-5
	1,6-heptanediol	13175-27-4

Preferred Isomers

	<i>1,3-propanediol, 2-butyl-</i>	2612-26-2
	<i>1,4-butanediol, 2-propyl-</i>	62946-68-3
5	<i>1,5-pentanediol, 2-ethyl-</i>	14189-13-0
	<i>2,3-pentanediol, 2,3-dimethyl-</i>	6931-70-0
	<i>2,3-pentanediol, 2,4-dimethyl-</i>	66225-53-4
	<i>2,3-pentanediol, 3,4-dimethyl-</i>	37164-04-8
	<i>2,3-pentanediol, 4,4-dimethyl-</i>	89851-45-6
10	<i>3,4-pentanediol, 2,3-dimethyl-</i>	Method B
	<i>1,6-hexanediol, 2-methyl-</i>	25258-92-8
	<i>1,6-hexanediol, 3-methyl-</i>	4089-71-8
	<i>1,3-heptanediol</i>	23433-04-7
	<i>1,4-heptanediol</i>	40646-07-9
15	<i>1,5-heptanediol</i>	60096-09-5
	<i>1,6-heptanediol</i>	13175-27-4

More Preferred Isomers

20	2,3-pentanediol, 2,3-dimethyl-	6931-70-0
	2,3-pentanediol, 2,4-dimethyl-	66225-53-4
	2,3-pentanediol, 3,4-dimethyl-	37164-04-8
	2,3-pentanediol, 4,4-dimethyl-	89851-45-6
25	3,4-pentanediol, 2,3-dimethyl-	Method B

Inoperable Isomers

	<i>1,3-propanediol, 2-methyl-2-isopropyl-</i>
	<i>1,2-butanediol, 2-ethyl-3-methyl-</i>
30	<i>1,3-butanediol, 2,2,3-trimethyl-</i>
	<i>1,3-butanediol, 2-ethyl-2-methyl-</i>
	<i>1,3-butanediol, 2-ethyl-3-methyl-</i>
	<i>1,3-butanediol, 2-isopropyl-</i>
	<i>1,3-butanediol, 2-propyl-</i>
35	<i>1,4-butanediol, 2,2,3-trimethyl</i>
	<i>1,4-butanediol, 3-ethyl-1-methyl-</i>
	<i>1,2-pentanediol, 2,3-dimethyl-</i>
	<i>1,2-pentanediol, 2,4-dimethyl-</i>
	<i>1,2-pentanediol, 3,3-dimethyl-</i>
40	<i>1,2-pentanediol, 3,4-dimethyl-</i>
	<i>1,2-pentanediol, 4,4-dimethyl-</i>
	<i>1,2-pentanediol, 2-ethyl-</i>
	<i>1,3-pentanediol, 2,2-dimethyl-</i>
	<i>1,3-pentanediol, 2,3-dimethyl-</i>

- 1,3-pentanediol, 2,4-dimethyl-
1,3-pentanediol, 2-ethyl-
1,3-pentanediol, 3,4-dimethyl-
1,3-pentanediol, 4,4-dimethyl-
5 1,4-pentanediol, 2,2-dimethyl-
1,4-pentanediol, 2,3-dimethyl-
1,4-pentanediol, 2,4-dimethyl-
1,4-pentanediol, 3,3-dimethyl-
1,4-pentanediol, 3,4-dimethyl-
10 2,4-pentanediol, 2,3-dimethyl-
2,4-pentanediol, 2,4-dimethyl-
2,4-pentanediol, 3,3-dimethyl-
1,2-hexanediol, 2-methyl-
1,2-hexanediol, 3-methyl-
15 1,2-hexanediol, 4-methyl-
1,2-hexanediol, 5-methyl-
1,3-hexanediol, 2-methyl-
1,3-hexanediol, 3-methyl-
1,3-hexanediol, 4-methyl-
20 1,3-hexanediol, 5-methyl-
1,4-hexanediol, 2-methyl-
1,4-hexanediol, 3-methyl-
1,4-hexanediol, 4-methyl-
1,4-hexanediol, 5-methyl-
25 1,5-hexanediol, 2-methyl-
1,5-hexanediol, 3-methyl-
1,5-hexanediol, 4-methyl-
1,5-hexanediol, 5-methyl-
2,4-hexanediol, 2-methyl-
30 2,4-hexanediol, 3-methyl-
2,4-hexanediol, 4-methyl-
2,4-hexanediol, 5-methyl-
2,5-hexanediol, 2-methyl-
2,5-hexanediol, 3-methyl-
35 1,2-heptanediol
2,3-heptanediol
2,4-heptanediol
2,5-heptanediol
2,6-heptanediol
40 3,4-heptanediol
1,7-heptanediol
3,5-heptanediol

*** 146452-51-9; 146452-50-8; 146452-49-5; 146452-48-4;
123807-34-1; 123807-33-0; 123807-32-9; 123807-31-8;
and mixtures thereof.

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TABLE IV
OCTANEDIOL ISOMERS

PROPANEDIOL DERIVATIVES

10	Chemical Name	CAS No.
	<u>Operable Isomers</u>	
	1,3-propanediol, 2-(2-methylbutyl)-	87194-40-9
	1,3-propanediol, 2-(1,1-dimethylpropyl)-	Method D
	1,3-propanediol, 2-(1,2-dimethylpropyl)-	Method D
15	1,3-propanediol, 2-(1-ethylpropyl)-	25462-28-6
	1,3-propanediol, 2-(1-methylbutyl)-	22131-29-9
	1,3-propanediol, 2-(2,2-dimethylpropyl)-	Method D
	1,3-propanediol, 2-(3-methylbutyl)-	25462-27-5
	1,3-propanediol, 2-butyl-2-methyl-	3121-83-3
20	1,3-propanediol, 2-ethyl-2-isopropyl-	24765-55-7
	1,3-propanediol, 2-ethyl-2-propyl-	25450-88-8
	1,3-propanediol, 2-methyl-2-(1-methylpropyl)-	813-60-5
	1,3-propanediol, 2-methyl-2-(2-methylpropyl)-	25462-42-4
	1,3-propanediol, 2-tertiary-butyl-2-methyl-	25462-45-7
25	<u>More Preferred Isomers</u>	
	1,3-propanediol, 2-(1,1-dimethylpropyl)-	Method D
	1,3-propanediol, 2-(1,2-dimethylpropyl)-	Method D
30	1,3-propanediol, 2-(1-ethylpropyl)-	25462-28-6
	1,3-propanediol, 2-(2,2-dimethylpropyl)-	Method D
	1,3-propanediol, 2-ethyl-2-isopropyl-	24765-55-7
	1,3-propanediol, 2-methyl-2-(1-methylpropyl)-	813-60-5
	1,3-propanediol, 2-methyl-2-(2-methylpropyl)-	25462-42-4
35	1,3-propanediol, 2-tertiary-butyl-2-methyl-	25462-45-7

Inoperable Isomers

1,3-propanediol, 2-pentyl-

40

BUTANEDIOL DERIVATIVES

Operable Isomers

	1,3-butanediol, 2,2-diethyl-	99799-77-6
	1,3-butanediol, 2-(1-methylpropyl)-	Method C
5	1,3-butanediol, 2-butyl-	83988-22-1
	1,3-butanediol, 2-ethyl-2,3-dimethyl-	Method D
	1,3-butanediol, 2-(1,1-dimethylethyl)-	67271-58-3
	1,3-butanediol, 2-(2-methylpropyl)-	Method C
	1,3-butanediol, 2-methyl-2-isopropyl-	Method C
10	1,3-butanediol, 2-methyl-2-propyl-	99799-79-8
	1,3-butanediol, 3-methyl-2-isopropyl-	Method C
	1,3-butanediol, 3-methyl-2-propyl-	Method D
	1,4-butanediol, 2,2-diethyl-	Method H
	1,4-butanediol, 2-methyl-2-propyl-	Method H
15	1,4-butanediol, 2-(1-methylpropyl)-	Method H
	1,4-butanediol, 2-ethyl-2,3-dimethyl-	Method F
	1,4-butanediol, 2-ethyl-3,3-dimethyl-	Method F
	1,4-butanediol, 2-(1,1-dimethylethyl)-	36976-70-2
	1,4-butanediol, 2-(2-methylpropyl)-	Method F
20	1,4-butanediol, 2-methyl-3-propyl-	90951-76-1
	1,4-butanediol, 3-methyl-2-isopropyl-	99799-24-3

Preferred Isomers

25	1,3-butanediol, 2,2-diethyl-	99799-77-6
	1,3-butanediol, 2-(1-methylpropyl)-	Method C
	1,3-butanediol, 2-butyl-	83988-22-1
	1,3-butanediol, 2-ethyl-2,3-dimethyl-	Method D
	1,3-butanediol, 2-(1,1-dimethylethyl)-	67271-58-3
30	1,3-butanediol, 2-(2-methylpropyl)-	Method C
	1,3-butanediol, 2-methyl-2-isopropyl-	Method C
	1,3-butanediol, 2-methyl-2-propyl-	99799-79-8
	1,3-butanediol, 3-methyl-2-propyl-	Method D
	1,4-butanediol, 2,2-diethyl-	Method H
35	1,4-butanediol, 2-ethyl-2,3-dimethyl-	Method F
	1,4-butanediol, 2-ethyl-3,3-dimethyl-	Method F
	1,4-butanediol, 2-(1,1-dimethylethyl)-	36976-70-2
	1,4-butanediol, 3-methyl-2-isopropyl-	99799-24-3

More Preferred Isomers

	1,3-butanediol, 2-(1-methylpropyl)-	Method C
	1,3-butanediol, 2-(2-methylpropyl)-	Method C
5	1,3-butanediol, 2-butyl-	83988-22-1
	1,3-butanediol, 2-methyl-2-propyl-	99799-79-8
	1,3-butanediol, 3-methyl-2-propyl-	Method D
	1,4-butanediol, 2,2-diethyl-	Method H
	1,4-butanediol, 2-ethyl-2,3-dimethyl-	Method F
10	1,4-butanediol, 2-ethyl-3,3-dimethyl-	Method F
	1,4-butanediol, 2-(1,1-dimethylethyl)-	36976-70-2

Inoperable Isomers

- 15 1,4-butanediol, 2-butyl-
 1,2-butanediol, 2-ethyl-3,3-dimethyl-
 1,4-butanediol, 2-methyl-2-isopropyl-
 1,2-butanediol, 3-methyl-2-isopropyl-
 1,4-butanediol, 2,2,3,3-tetramethyl-

20

TRIMETHYLPENTANEDIOL ISOMERS**Operable Isomers**

25	1,3-pentanediol, 2,2,3-trimethyl-	35512-54-0
	1,3-pentanediol, 2,2,4-trimethyl-	144-19-4
	1,3-pentanediol, 2,3,4-trimethyl-	116614-13-2
	1,3-pentanediol, 2,4,4-trimethyl-	109387-36-2
	1,3-pentanediol, 3,4,4-trimethyl-	81756-50-5
30	1,4-pentanediol, 2,2,3-trimethyl-	Method H
	1,4-pentanediol, 2,2,4-trimethyl-	80864-10-4
	1,4-pentanediol, 2,3,3-trimethyl-	Method H
	1,4-pentanediol, 2,3,4-trimethyl-	92340-74-4
	1,4-pentanediol, 3,3,4-trimethyl-	16466-35-6
35	1,5-pentanediol, 2,2,3-trimethyl-	Method F
	1,5-pentanediol, 2,2,4-trimethyl-	3465-14-3
	1,5-pentanediol, 2,3,3-trimethyl-	Method A
	1,5-pentanediol, 2,3,4-trimethyl-	85373-83-7
	2,4-pentanediol, 2,3,3-trimethyl-	24892-51-1
40	2,4-pentanediol, 2,3,4-trimethyl-	24892-52-2

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Preferred Isomers

	1,3-pentanediol, 2,2,3-trimethyl-	35512-54-0
	1,3-pentanediol, 2,2,4-trimethyl-	144-19-4
5	1,3-pentanediol, 2,3,4-trimethyl-	116614-13-2
	1,3-pentanediol, 2,4,4-trimethyl-	109387-36-2
	1,3-pentanediol, 3,4,4-trimethyl-	81756-50-5
	1,4-pentanediol, 2,2,3-trimethyl-	Method H
	1,4-pentanediol, 2,2,4-trimethyl-	80864-10-4
10	1,4-pentanediol, 2,3,3-trimethyl-	Method F
	1,4-pentanediol, 2,3,4-trimethyl-	92340-74-4
	1,4-pentanediol, 3,3,4-trimethyl-	16466-35-6
	1,5-pentanediol, 2,2,3-trimethyl-	Method A
	1,5-pentanediol, 2,2,4-trimethyl-	3465-14-3
15	1,5-pentanediol, 2,3,3-trimethyl-	Method A
	2,4-pentanediol, 2,3,4-trimethyl-	24892-52-2

More Preferred Isomers

20	1,3-pentanediol, 2,3,4-trimethyl-	116614-13-2
	1,4-pentanediol, 2,3,4-trimethyl-	92340-74-4
	1,5-pentanediol, 2,2,3-trimethyl-	Method A
	1,5-pentanediol, 2,2,4-trimethyl-	3465-14-3
	1,5-pentanediol, 2,3,3-trimethyl-	Method A

25

Inoperable Isomers

	1,2-pentanediol, 2,3,3-trimethyl-
	1,2-pentanediol, 2,3,4-trimethyl-
30	1,2-pentanediol, 2,4,4-trimethyl-
	1,2-pentanediol, 3,3,4-trimethyl-
	1,2-pentanediol, 3,4,4-trimethyl-
	2,3-pentanediol, 2,3,4-trimethyl-
	2,3-pentanediol, 2,4,4-trimethyl-
35	2,3-pentanediol, 3,4,4-trimethyl-

ETHYLMETHYLPENTANEDIOL ISOMERS**Operable Isomers**

40	1,3-pentanediol, 2-ethyl-2-methyl-	Method C
	1,3-pentanediol, 2-ethyl-3-methyl-	Method D
	1,3-pentanediol, 2-ethyl-4-methyl-	148904-97-6
	1,3-pentanediol, 3-ethyl-2-methyl-	55661-05-7

	1,4-pentanediol, 2-ethyl-2-methyl-	Method H
	1,4-pentanediol, 2-ethyl-3-methyl-	Method F
	1,4-pentanediol, 2-ethyl-4-methyl-	Method G
	1,4-pentanediol, 3-ethyl-2-methyl-	Method F
5	1,4-pentanediol, 3-ethyl-3-methyl-	Method F
	1,5-pentanediol, 2-ethyl-2-methyl-	Method F
	1,5-pentanediol, 2-ethyl-3-methyl-	Method F
	1,5-pentanediol, 2-ethyl-4-methyl-	54886-83-8
	1,5-pentanediol, 3-ethyl-3-methyl-	Method F
10	2,4-pentanediol, 3-ethyl-2-methyl-	57740-12-2
		Method G

More Preferred Isomers

	1,3-pentanediol, 2-ethyl-2-methyl-	Method C
15	1,3-pentanediol, 2-ethyl-3-methyl-	Method D
	1,3-pentanediol, 2-ethyl-4-methyl-	148904-97-6
	1,3-pentanediol, 3-ethyl-2-methyl-	55661-05-7
	1,4-pentanediol, 2-ethyl-2-methyl-	Method H
	1,4-pentanediol, 2-ethyl-3-methyl-	Method F
20	1,4-pentanediol, 2-ethyl-4-methyl-	Method G
	1,5-pentanediol, 3-ethyl-3-methyl-	57740-12-2
	2,4-pentanediol, 3-ethyl-2-methyl-	Method G

Inoperable Isomers

25	1,2-pentanediol, 2-ethyl-3-methyl-
	1,2-pentanediol, 2-ethyl-4-methyl-
	1,2-pentanediol, 3-ethyl-2-methyl-
	1,2-pentanediol, 3-ethyl-3-methyl-
30	1,2-pentanediol, 3-ethyl-4-methyl-
	1,3-pentanediol, 3-ethyl-4-methyl-
	1,4-pentanediol, 3-ethyl-4-methyl-
	1,5-pentanediol, 3-ethyl-2-methyl-
	2,3-pentanediol, 3-ethyl-2-methyl-
35	2,3-pentanediol, 3-ethyl-4-methyl-
	2,4-pentanediol, 3-ethyl-3-methyl-

PROPYLPENTANEDIOL ISOMERS

40 **Operable Isomers**

	1,3-pentanediol, 2-isopropyl-	Method D
	1,3-pentanediol, 2-propyl-	Method C
	1,4-pentanediol, 2-isopropyl-	Method H

1,4-pentanediol, 2-propyl-	Method H
1,4-pentanediol, 3-isopropyl-	Method H
1,5-pentanediol, 2-isopropyl-	90951-89-6
2,4-pentanediol, 3-propyl-	Method C

5

More Preferred Isomers

1,3-pentanediol, 2-isopropyl-	Method D
1,3-pentanediol, 2-propyl-	Method C
10 1,4-pentanediol, 2-isopropyl-	Method H
1,4-pentanediol, 2-propyl-	Method H
1,4-pentanediol, 3-isopropyl-	Method H
2,4-pentanediol, 3-propyl-	Method C

15 **Inoperable Isomers**

1,2-pentanediol, 2-propyl-	
1,2-pentanediol, 2-isopropyl-	
1,4-pentanediol, 3-propyl-	
20 1,5-pentanediol, 2-propyl-	
2,4-pentanediol, 3-isopropyl-	

DIMETHYLHEXANEDIOL ISOMERS

25

Operable Isomers

1,3-hexanediol, 2,2-dimethyl-	22006-96-8
1,3-hexanediol, 2,3-dimethyl-	Method D
30 1,3-hexanediol, 2,4-dimethyl-	78122-99-3
1,3-hexanediol, 2,5-dimethyl-	Method C
1,3-hexanediol, 3,4-dimethyl-	Method D
1,3-hexanediol, 3,5-dimethyl-	Method D
1,3-hexanediol, 4,4-dimethyl-	Method C
35 1,3-hexanediol, 4,5-dimethyl-	Method C
1,4-hexanediol, 2,2-dimethyl-	Method F
1,4-hexanediol, 2,3-dimethyl-	Method F
1,4-hexanediol, 2,4-dimethyl-	Method G
1,4-hexanediol, 2,5-dimethyl-	22417-60-3
40 1,4-hexanediol, 3,3-dimethyl-	Method F
1,4-hexanediol, 3,4-dimethyl-	Method E
1,4-hexanediol, 3,5-dimethyl-	Method H
1,4-hexanediol, 4,5-dimethyl-	Method E
1,4-hexanediol, 5,5-dimethyl-	38624-38-3

	1,5-hexanediol, 2,2-dimethyl-	Method A
	1,5-hexanediol, 2,3-dimethyl-	62718-05-2
	1,5-hexanediol, 2,4-dimethyl-	73455-82-0
	1,5-hexanediol, 2,5-dimethyl-	58510-28-4
5	1,5-hexanediol, 3,3-dimethyl-	41736-99-6
	1,5-hexanediol, 3,4-dimethyl-	Method A
	1,5-hexanediol, 3,5-dimethyl-	Method G
	1,5-hexanediol, 4,5-dimethyl-	Method F
	1,6-hexanediol, 2,2-dimethyl-	13622-91-8
10	1,6-hexanediol, 2,3-dimethyl-	Method F
	1,6-hexanediol, 2,4-dimethyl-	Method F
	1,6-hexanediol, 2,5-dimethyl-	49623-11-2
	1,6-hexanediol, 3,3-dimethyl-	Method F
	1,6-hexanediol, 3,4-dimethyl-	65363-45-3
15	2,4-hexanediol, 2,3-dimethyl-	26344-17-2
	2,4-hexanediol, 2,4-dimethyl-	29649-22-7
	2,4-hexanediol, 2,5-dimethyl-	3899-89-6
	2,4-hexanediol, 3,3-dimethyl-	42412-51-1
	2,4-hexanediol, 3,4-dimethyl-	90951-83-0
20	2,4-hexanediol, 3,5-dimethyl-	159300-34-2
	2,4-hexanediol, 4,5-dimethyl-	Method D
	2,4-hexanediol, 5,5-dimethyl-	108505-10-8
	2,5-hexanediol, 2,3-dimethyl-	Method G
	2,5-hexanediol, 2,4-dimethyl-	Method G
25	2,5-hexanediol, 2,5-dimethyl-	110-03-2
	2,5-hexanediol, 3,3-dimethyl-	Method H
	2,5-hexanediol, 3,4-dimethyl-	99799-30-1
	2,6-hexanediol, 3,3-dimethyl-	Method A
30	<u>More Preferred Isomers</u>	
	1,3-hexanediol, 2,2-dimethyl-	22006-96-8
	1,3-hexanediol, 2,3-dimethyl-	Method D
	1,3-hexanediol, 2,4-dimethyl-	78122-99-3
35	1,3-hexanediol, 2,5-dimethyl-	Method C
	1,3-hexanediol, 3,4-dimethyl-	Method D
	1,3-hexanediol, 3,5-dimethyl-	Method D
	1,3-hexanediol, 4,4-dimethyl-	Method C
	1,3-hexanediol, 4,5-dimethyl-	Method C
40	1,4-hexanediol, 2,2-dimethyl-	Method H
	1,4-hexanediol, 2,3-dimethyl-	Method F
	1,4-hexanediol, 2,4-dimethyl-	Method G
	1,4-hexanediol, 2,5-dimethyl-	22417-60-3
	1,4-hexanediol, 3,3-dimethyl-	Method F

	1,4-hexanediol, 3,4-dimethyl-	Method E
	1,4-hexanediol, 3,5-dimethyl-	Method H
	1,4-hexanediol, 4,5-dimethyl-	Method E
	1,4-hexanediol, 5,5-dimethyl-	38624-38-3
5	1,5-hexanediol, 2,2-dimethyl-	Method A
	1,5-hexanediol, 2,3-dimethyl-	62718-05-2
	1,5-hexanediol, 2,4-dimethyl-	73455-82-0
	1,5-hexanediol, 2,5-dimethyl-	58510-28-4
	1,5-hexanediol, 3,3-dimethyl-	41736-99-6
10	1,5-hexanediol, 3,4-dimethyl-	Method A
	1,5-hexanediol, 3,5-dimethyl-	Method G
	1,5-hexanediol, 4,5-dimethyl-	Method F
	2,6-hexanediol, 3,3-dimethyl-	Method A

15 Inoperable Isomers

	1,2-hexanediol, 2,3-dimethyl-
	1,2-hexanediol, 2,4-dimethyl-
	1,2-hexanediol, 2,5-dimethyl-
20	1,2-hexanediol, 3,3-dimethyl-
	1,2-hexanediol, 3,4-dimethyl-
	1,2-hexanediol, 3,5-dimethyl-
	1,2-hexanediol, 4,4-dimethyl-
	1,2-hexanediol, 4,5-dimethyl-
25	1,2-hexanediol, 5,5-dimethyl-
	2,3-hexanediol, 2,3-dimethyl-
	2,3-hexanediol, 2,4-dimethyl-
	2,3-hexanediol, 2,5-dimethyl-
	2,3-hexanediol, 3,4-dimethyl-
30	2,3-hexanediol, 3,5-dimethyl-
	2,3-hexanediol, 4,4-dimethyl-
	2,3-hexanediol, 4,5-dimethyl-
	2,3-hexanediol, 5,5-dimethyl-
	3,4-hexanediol, 2,2-dimethyl-
35	3,4-hexanediol, 2,3-dimethyl-
	3,4-hexanediol, 2,4-dimethyl-
	3,4-hexanediol, 2,5-dimethyl-
	3,4-hexanediol, 3,4-dimethyl-

40 **ETHYLHEXANEDIOL ISOMERS**

More Preferred Isomers

	1,3-hexanediol, 2-ethyl-	94-96-2
	1,3-hexanediol, 4-ethyl-	Method C
5	1,4-hexanediol, 2-ethyl-	148904-97-6
	1,4-hexanediol, 4-ethyl-	1113-00-4
	1,5-hexanediol, 2-ethyl-	58374-34-8
	2,4-hexanediol, 3-ethyl-	Method C
	2,4-hexanediol, 4-ethyl-	33683-47-5
10	2,5-hexanediol, 3-ethyl-	Method F

Inoperable Isomers

	1,5-hexanediol, 4-ethyl-
15	1,6-hexanediol, 2-ethyl-
	1,4-hexanediol, 3-ethyl-
	1,5-hexanediol, 3-ethyl-
	1,6-hexanediol, 3-ethyl-
	1,2-hexanediol, 2-ethyl-
20	1,2-hexanediol, 3-ethyl-
	1,2-hexanediol, 4-ethyl-
	2,3-hexanediol, 3-ethyl-
	2,3-hexanediol, 4-ethyl-
	3,4-hexanediol, 3-ethyl-
25	1,3-hexanediol, 3-ethyl-

METHYLHEPTANEDIOL ISOMERS**Operable Isomers**

30	1,3-heptanediol, 2-methyl-	109417-38-1
	1,3-heptanediol, 3-methyl-	165326-88-5
	1,3-heptanediol, 4-methyl-	Method C
	1,3-heptanediol, 5-methyl-	Method D
35	1,3-heptanediol, 6-methyl-	Method C
	1,4-heptanediol, 2-methyl-	15966-03-7
	1,4-heptanediol, 3-methyl-	7748-38-1
	1,4-heptanediol, 4-methyl-	72473-94-0
	1,4-heptanediol, 5-methyl-	63003-04-3
40	1,4-heptanediol, 6-methyl-	99799-25-4
	1,5-heptanediol, 2-methyl-	141605-00-7
	1,5-heptanediol, 3-methyl-	Method A
	1,5-heptanediol, 4-methyl-	Method A
	1,5-heptanediol, 5-methyl-	99799-26-5

	1,5-heptanediol, 6-methyl-	57740-00-8
	1,6-heptanediol, 2-methyl-	132148-22-2
	1,6-heptanediol, 3-methyl-	Method G
	1,6-heptanediol, 4-methyl-	156307-84-5
5	1,6-heptanediol, 5-methyl-	Method A
	1,6-heptanediol, 6-methyl-	5392-57-4
	2,4-heptanediol, 2-methyl-	38836-26-9
	2,4-heptanediol, 3-methyl-	6964-04-1
	2,4-heptanediol, 4-methyl-	165326-87-4
10	2,4-heptanediol, 5-methyl-	Method C
	2,4-heptanediol, 6-methyl-	79356-95-9
	2,5-heptanediol, 2-methyl-	141605-02-9
	2,5-heptanediol, 3-methyl-	Method G
	2,5-heptanediol, 4-methyl-	156407-38-4
15	2,5-heptanediol, 5-methyl-	148843-72-5
	2,5-heptanediol, 6-methyl-	51916-46-2
	2,6-heptanediol, 2-methyl-	73304-48-0
	2,6-heptanediol, 3-methyl-	29915-96-6
	2,6-heptanediol, 4-methyl-	106257-69-6
20	3,4-heptanediol, 3-methyl-	18938-50-6
	3,5-heptanediol, 2-methyl-	Method C
	3,5-heptanediol, 3-methyl-	99799-27-6
	3,5-heptanediol, 4-methyl-	156407-37-3
25	<u>More Preferred Isomers</u>	
	1,3-heptanediol, 2-methyl-	109417-38-1
	1,3-heptanediol, 3-methyl-	165326-88-5
	1,3-heptanediol, 4-methyl-	Method C
30	1,3-heptanediol, 5-methyl-	Method D
	1,3-heptanediol, 6-methyl-	Method C
	1,4-heptanediol, 2-methyl-	15966-03-7
	1,4-heptanediol, 3-methyl-	7748-38-1
	1,4-heptanediol, 4-methyl-	72473-94-0
35	1,4-heptanediol, 5-methyl-	63003-04-3
	1,4-heptanediol, 6-methyl-	99799-25-4
	1,5-heptanediol, 2-methyl-	141605-00-7
	1,5-heptanediol, 3-methyl-	Method A
	1,5-heptanediol, 4-methyl-	Method A
40	1,5-heptanediol, 5-methyl-	99799-26-5
	1,5-heptanediol, 6-methyl-	57740-00-8
	1,6-heptanediol, 2-methyl-	132148-22-2
	1,6-heptanediol, 3-methyl-	Method G
	1,6-heptanediol, 4-methyl-	156307-84-5

	1,6-heptanediol, 5-methyl-	Method A
	1,6-heptanediol, 6-methyl-	5392-57-4
	2,4-heptanediol, 2-methyl-	38836-26-9
	2,4-heptanediol, 3-methyl-	6964-04-1
5	2,4-heptanediol, 4-methyl-	165326-87-4
	2,4-heptanediol, 5-methyl-	Method C
	2,4-heptanediol, 6-methyl-	79356-95-9
	2,5-heptanediol, 2-methyl-	141605-02-9
	2,5-heptanediol, 3-methyl-	Method H
10	2,5-heptanediol, 4-methyl-	156407-38-4
	2,5-heptanediol, 5-methyl-	148843-72-5
	2,5-heptanediol, 6-methyl-	51916-46-2
	2,6-heptanediol, 2-methyl-	73304-48-0
	2,6-heptanediol, 3-methyl-	29915-96-6
15	2,6-heptanediol, 4-methyl-	106257-69-6
	3,4-heptanediol, 3-methyl-	18938-50-6
	3,5-heptanediol, 2-methyl-	Method C
	3,5-heptanediol, 4-methyl-	156407-37-3

20 Inoperable Isomers

- 1,7-heptanediol, 2-methyl-
- 1,7-heptanediol, 3-methyl-
- 1,7-heptanediol, 4-methyl-
- 25 2,3-heptanediol, 2-methyl-
- 2,3-heptanediol, 3-methyl-
- 2,3-heptanediol, 4-methyl-
- 2,3-heptanediol, 5-methyl-
- 2,3-heptanediol, 6-methyl-
- 30 3,4-heptanediol, 2-methyl-
- 3,4-heptanediol, 4-methyl-
- 3,4-heptanediol, 5-methyl-
- 3,4-heptanediol, 6-methyl-
- 1,2-heptanediol, 2-methyl-
- 35 1,2-heptanediol, 3-methyl-
- 1,2-heptanediol, 4-methyl-
- 1,2-heptanediol, 5-methyl-
- 1,2-heptanediol, 6-methyl-

40

OCTANEDIOL ISOMERS

34

More Preferred Isomers

	2,4-octanediol	90162-24-6
	2,5-octanediol	4527-78-0
5	2,6-octanediol	Method A
	2,7-octanediol	19686-96-5
	3,5-octanediol	24892-55-5
	3,6-octanediol	24434-09-1

10 **Inoperable Isomers**

	1,2-octanediol	1117-86-8
	1,3-octanediol	23433-05-8
	1,4-octanediol	51916-47-3
15	1,5-octanediol	2736-67-6
	1,6-octanediol	4060-76-6
	1,7-octanediol	13175-32-1
	1,8-octanediol	629-41-4
	2,3-octanediol	e.g., 98464-24-5
20	3,4-octanediol	e.g., 99799-31-2
	3,5-octanediol	e.g., 129025-63-4

TABLE V
NONANEDIOL ISOMERS

25

<u>Chemical Name</u>	<u>CAS No.</u>
<u>Preferred Isomers</u>	

2,4-pentanediol, 2,3,3,4-tetramethyl-	19424-43-2
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30

Operable Isomers

2,4-pentanediol, 3-tertiarybutyl-	142205-14-9
2,4-hexanediol, 2,5,5-trimethyl-	97460-08-7
2,4-hexanediol, 3,3,4-trimethyl-	Method D
35 2,4-hexanediol, 3,3,5-trimethyl-	27122-58-3
2,4-hexanediol, 3,5,5-trimethyl-	Method D
2,4-hexanediol, 4,5,5-trimethyl-	Method D
2,5-hexanediol, 3,3,4-trimethyl-	Method H
2,5-hexanediol, 3,3,5-trimethyl-	Method G

40

Inoperable Isomers

There are over 500 inoperable isomers including the following:

2,4-hexanediol, 2,4,5-trimethyl-	36587-81-2
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2,4-hexanediol, 2,3,5-trimethyl-, erythro-	26344-20-7
2,4-hexanediol, 2,3,5-trimethyl-, threo-	26343-49-7
1,3-propanediol, 2-butyl-2-ethyl-	115-84-4
2,4-hexanediol, 2,3,5-trimethyl-, threo-	26343-49-7

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TABLE VI
ALKYL GLYCERYL ETHERS, DI(HYDROXYALKYL) ETHERS, AND ARYL GLYCERYL ETHERS

10 *Preferred Monoglycerol Ethers and Derivatives*

1,2-propanediol, 3-(butyloxy)-, triethoxylated

1,2-propanediol, 3-(butyloxy)-, tetraethoxylated

More Preferred Monoglycerol Ethers

15 **and Derivatives**

CAS No.

22636-32-4

1,2-propanediol, 3-(n-pentyloxy)-

1,2-propanediol, 3-(2-pentyloxy)-

1,2-propanediol, 3-(3-pentyloxy)-

1,2-propanediol, 3-(2-methyl-1-butyloxy)-

20 **1,2-propanediol, 3-(iso-amyl-1-oxy)-**

1,2-propanediol, 3-(3-methyl-2-butyloxy)-

1,2-propanediol, 3-(cyclohexyloxy)-

1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-

1,3-propanediol, 2-(pentyloxy)-

25 **1,3-propanediol, 2-(2-pentyloxy)-**

1,3-propanediol, 2-(3-pentyloxy)-

1,3-propanediol, 2-(2-methyl-1-butyloxy)-

1,3-propanediol, 2-(iso-amyl-1-oxy)-

1,3-propanediol, 2-(3-methyl-2-butyloxy)-

30 **1,3-propanediol, 2-(cyclohexyloxy)-**

1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-

1,2-propanediol, 3-(butyloxy)-, pentaethoxylated

1,2-propanediol, 3-(butyloxy)-, hexaethoxylated

1,2-propanediol, 3-(butyloxy)-, heptaethoxylated

35 **1,2-propanediol, 3-(butyloxy)-, octaethoxylated**

1,2-propanediol, 3-(butyloxy)-, nonaethoxylated

1,2-propanediol, 3-(butyloxy)-, monopropoxylated

1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated

1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated

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More Preferred Di(hydroxyalkyl) Ethers

bis(2-hydroxybutyl) ether

bis(2-hydroxycyclopentyl) ether

36

Inoperable Monoglycerol Ethers

- 1,2-propanediol, 3-ethyloxy-
 1,2-propanediol, 3-propyloxy-
 1,2-propanediol, 3-isopropyloxy-
 5 1,2-propanediol, 3-butyloxy-
 1,2-propanediol, 3-isobutyloxy-
 1,2-propanediol, 3-tert-butyloxy-
 1,2-propanediol, 3-octyloxy-
 10 1,2-propanediol, 3-(2-ethylhexyloxy)-
 1,2-propanediol, 3-(cyclopentyloxy)-
 1,2-propanediol, 3-(1-cyclohex-2-enyloxy)-
 1,3-propanediol, 2-(1-cyclohex-2-enyloxy)-

AROMATIC GLYCERYL ETHERS

15

Operable Aromatic Glyceryl Ethers

- 1,2-propanediol, 3-phenyloxy-
 1,2-propanediol, 3-benzyloxy-
 20 1,2-propanediol, 3-(2-phenylethyloxy)-
 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-
 1,3-propanediol, 2-phenyloxy-
 1,3-propanediol, 2-(m-cresyloxy)-
 1,3-propanediol, 2-(p-cresyloxy)-
 25 1,3-propanediol, 2-benzyloxy-
 1,3-propanediol, 2-(2-phenylethyloxy)-
 1,3-propanediol, 2-(1-phenylethyloxy)-

Preferred Aromatic Glyceryl Ethers

30

- 1,2-propanediol, 3-phenyloxy-*
1,2-propanediol, 3-benzyloxy-
1,2-propanediol, 3-(2-phenylethyloxy)-
1,3-propanediol, 2-(m-cresyloxy)-
 35 *1,3-propanediol, 2-(p-cresyloxy)-*
1,3-propanediol, 2-benzyloxy-
1,3-propanediol, 2-(2-phenylethyloxy)-

Preferred Aromatic Glyceryl Ethers

40

- 1,2-propanediol, 3-phenyloxy-**
1,2-propanediol, 3-benzyloxy-
1,2-propanediol, 3-(2-phenylethyloxy)-
1,3-propanediol, 2-(m-cresyloxy)-

1,3-propanediol, 2-(p-cresyloxy)-
1,3-propanediol, 2-(2-phenylethyloxy)-

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TABLE VII
ALICYCLIC DIOLS AND DERIVATIVES

	Chemical Name	CAS No.
	<u>Preferred Cyclic Diols and Derivatives</u>	
10	<i>1-isopropyl-1,2-cyclobutanediol</i>	59895-32-8
	<i>3-ethyl-4-methyl-1,2-cyclobutanediol</i>	
	<i>3-propyl-1,2-cyclobutanediol</i>	
	<i>3-isopropyl-1,2-cyclobutanediol</i>	42113-90-6
15	<i>1-ethyl-1,2-cyclopentanediol</i>	67396-17-2
	<i>1,2-dimethyl-1,2-cyclopentanediol</i>	33046-20-7
	<i>1,4-dimethyl-1,2-cyclopentanediol</i>	89794-56-9
	<i>2,4,5-trimethyl-1,3-cyclopentanediol</i>	
20	<i>3,3-dimethyl-1,2-cyclopentanediol</i>	89794-57-0
	<i>3,4-dimethyl-1,2-cyclopentanediol</i>	70051-69-3
	<i>3,5-dimethyl-1,2-cyclopentanediol</i>	89794-58-1
	<i>3-ethyl-1,2-cyclopentanediol</i>	
	<i>4,4-dimethyl-1,2-cyclopentanediol</i>	70197-54-5
25	<i>4-ethyl-1,2-cyclopentanediol</i>	
	<i>1,1-bis(hydroxymethyl)cyclohexane</i>	2658-60-8
	<i>1,2-bis(hydroxymethyl)cyclohexane</i>	76155-27-6
	<i>1,2-dimethyl-1,3-cyclohexanediol</i>	53023-07-7
30	<i>1,3-bis(hydroxymethyl)cyclohexane</i>	13022-98-5
	<i>1,3-dimethyl-1,3-cyclohexanediol</i>	128749-93-9
	<i>1,6-dimethyl-1,3-cyclohexanediol</i>	164713-16-0
	<i>1-hydroxy-cyclohexaneethanol</i>	40894-17-5
	<i>1-hydroxy-cyclohexanemethanol</i>	15753-47-6
35	<i>1-ethyl-1,3-cyclohexanediol</i>	10601-18-0
	<i>1-methyl-1,2-cyclohexanediol</i>	52718-65-7
	<i>2,2-dimethyl-1,3-cyclohexanediol</i>	114693-83-3
	<i>2,3-dimethyl-1,4-cyclohexanediol</i>	70156-82-0
	<i>2,4-dimethyl-1,3-cyclohexanediol</i>	
40	<i>2,5-dimethyl-1,3-cyclohexanediol</i>	
	<i>2,6-dimethyl-1,4-cyclohexanediol</i>	34958-42-4
	<i>2-ethyl-1,3-cyclohexanediol</i>	155433-88-8
	<i>2-hydroxycyclohexaneethanol</i>	24682-42-6
	<i>2-hydroxyethyl-1-cyclohexanol</i>	

	<i>2-hydroxymethylcyclohexanol</i>	89794-52-5
	<i>3-hydroxyethyl-1-cyclohexanol</i>	
	<i>3-hydroxycyclohexaneethanol</i>	86576-87-6
	<i>3-hydroxymethylcyclohexanol</i>	
5	<i>3-methyl-1,2-cyclohexanediol</i>	23477-91-0
	<i>4,4-dimethyl-1,3-cyclohexanediol</i>	14203-50-0
	<i>4,5-dimethyl-1,3-cyclohexanediol</i>	
	<i>4,6-dimethyl-1,3-cyclohexanediol</i>	16066-66-3
	<i>4-ethyl-1,3-cyclohexanediol</i>	
10	<i>4-hydroxyethyl-1-cyclohexanol</i>	
	<i>4-hydroxymethylcyclohexanol</i>	33893-85-5
	<i>4-methyl-1,2-cyclohexanediol</i>	23832-27-1
	<i>5,5-dimethyl-1,3-cyclohexanediol</i>	51335-83-2
	<i>5-ethyl-1,3-cyclohexanediol</i>	
15	<i>1,2-cycloheptanediol</i>	108268-28-6
	<i>2-methyl-1,3-cycloheptanediol</i>	101375-80-8
	<i>2-methyl-1,4-cycloheptanediol</i>	
	<i>4-methyl-1,3-cycloheptanediol</i>	
20	<i>5-methyl-1,3-cycloheptanediol</i>	
	<i>5-methyl-1,4-cycloheptanediol</i>	90201-00-6
	<i>6-methyl-1,4-cycloheptanediol</i>	
	<i>1,3-cyclooctanediol</i>	101935-36-8
25	<i>1,4-cyclooctanediol</i>	73982-04-4
	<i>1,5-cyclooctanediol</i>	23418-82-8
	<i>1,2-cyclohexanediol, diethoxylate</i>	
	<i>1,2-cyclohexanediol, triethoxylate</i>	
30	<i>1,2-cyclohexanediol, tetraethoxylate</i>	
	<i>1,2-cyclohexanediol, pentaethoxylate</i>	
	<i>1,2-cyclohexanediol, hexaethoxylate</i>	
	<i>1,2-cyclohexanediol, heptaethoxylate</i>	
	<i>1,2-cyclohexanediol, octaethoxylate</i>	
35	<i>1,2-cyclohexanediol, nonaethoxylate</i>	
	<i>1,2-cyclohexanediol, monopropoxylate</i>	
	<i>1,2-cyclohexanediol, monobutylenoxylate</i>	
	<i>1,2-cyclohexanediol, dibutylenoxylate</i>	
40	<i>1,2-cyclohexanediol, tributylenoxylate</i>	

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	Chemical Name <u>More Preferred Cyclic Diols and Derivatives</u>	CAS No.
	1-isopropyl-1,2-cyclobutanediol	59895-32-8
5	3-ethyl-4-methyl-1,2-cyclobutanediol	
	3-propyl-1,2-cyclobutanediol	
	3-isopropyl-1,2-cyclobutanediol	42113-90-6
	1-ethyl-1,2-cyclopentanediol	67396-17-2
10	1,2-dimethyl-1,2-cyclopentanediol	33046-20-7
	1,4-dimethyl-1,2-cyclopentanediol	89794-56-9
	3,3-dimethyl-1,2-cyclopentanediol	89794-57-0
	3,4-dimethyl-1,2-cyclopentanediol	70051-69-3
	3,5-dimethyl-1,2-cyclopentanediol	89794-58-1
15	3-ethyl-1,2-cyclopentanediol	
	4,4-dimethyl-1,2-cyclopentanediol	70197-54-5
	4-ethyl-1,2-cyclopentanediol	
	1,1-bis(hydroxymethyl)cyclohexane	2658-60-8
20	1,2-bis(hydroxymethyl)cyclohexane	76155-27-6
	1,2-dimethyl-1,3-cyclohexanediol	53023-07-7
	1,3-bis(hydroxymethyl)cyclohexane	13022-98-5
	1-hydroxy-cyclohexanemethanol	15753-47-6
	1-methyl-1,2-cyclohexanediol	52718-65-7
25	3-hydroxymethylcyclohexanol	
	3-methyl-1,2-cyclohexanediol	23477-91-0
	4,4-dimethyl-1,3-cyclohexanediol	14203-50-0
	4,5-dimethyl-1,3-cyclohexanediol	
	4,6-dimethyl-1,3-cyclohexanediol	16066-66-3
30	4-ethyl-1,3-cyclohexanediol	
	4-hydroxyethyl-1-cyclohexanol	
	4-hydroxymethylcyclohexanol	33893-85-5
	4-methyl-1,2-cyclohexanediol	23832-27-1
35	1,2-cycloheptanediol	108268-28-6
	1,2-cyclohexanediol, pentaethoxylate	
	1,2-cyclohexanediol, hexaethoxylate	
	1,2-cyclohexanediol, heptaethoxylate	
40	1,2-cyclohexanediol, octaethoxylate	
	1,2-cyclohexanediol, nonaethoxylate	
	1,2-cyclohexanediol, monopropoxylate	
	1,2-cyclohexanediol, dibutylene xylate	

The unsaturated alicyclic diols include the following known unsaturated alicyclic diols:

5 **Operable Unsaturated Alicyclic Diols**

	Chemical Name	CAS No.
	1,2-Cyclobutanediol, 1-ethenyl-2-ethyl-	58016-14-1
	3-Cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-	90112-64-4
10	3-Cyclobutene-1,2-diol, 3,4-diethyl-	142543-60-0
	3-Cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-	142543-56-4
	3-Cyclobutene-1,2-diol, 3-butyl-	142543-55-3
	1,2-Cyclopentanediol, 1,2-dimethyl-4-methylene-	103150-02-3
15	1,2-Cyclopentanediol, 1-ethyl-3-methylene-	90314-52-6
	1,2-Cyclopentanediol, 4-(1-propenyl)	128173-45-5
	3-Cyclopentene-1,2-diol, 1-ethyl-3-methyl-	90314-43-5
	1,2-Cyclohexanediol, 1-ethenyl-	134134-16-0
20	1,2-Cyclohexanediol, 1-methyl-3-methylene-	98204-78-5
	1,2-Cyclohexanediol, 1-methyl-4-methylene-	133358-53-9
	1,2-Cyclohexanediol, 3-ethenyl-	55310-51-5
	1,2-Cyclohexanediol, 4-ethenyl-	85905-16-4
	3-Cyclohexene-1,2-diol, 2,6-dimethyl-	81969-75-7
25	3-Cyclohexene-1,2-diol, 6,6-dimethyl-	61875-93-2
	4-Cyclohexene-1,2-diol, 3,6-dimethyl-	156808-73-0
	4-Cyclohexene-1,2-diol, 4,5-dimethyl-	154351-54-9
	3-Cyclooctene-1,2-diol	170211-27-5
30	4-Cyclooctene-1,2-diol	124791-61-3
	5-Cyclooctene-1,2-diol	117468-07-2

Inoperable Unsaturated Cyclic Diols

35	1,2-Cyclopentanediol, 1-(1-methylethenyl)-	61447-83-4
	1,2-Propanediol, 1-cyclopentyl-	55383-20-5
	1,3-Cyclopentanediol, 2-(1-methylethylidene)-	65651-46-9
	1,3-Propanediol, 2-(1-cyclopenten-1-yl)-	77192-43-9
	1,3-Propanediol, 2-(2-cyclopenten-1-yl)-	25462-31-1
40	1,2-Ethanediol, 1-(1-cyclohexen-1-yl)-	151674-61-2
	1,2-Ethanediol, 1-(3-cyclohexen-1-yl)	64011-53-6
	2-Cyclohexene-1,4-diol, 5,5-dimethyl-	147274-55-3
	4-Cyclohexene-1,3-diol, 3,6-dimethyl-	127716-90-9

1,3-Cycloheptanediol, 2-methylene-	132292-67-2
5-Cycloheptene-1,3-diol, 1-methyl-	160813-33-2
5-Cycloheptene-1,3-diol, 5-methyl-	160813-32-1
2-Cyclooctene-1,4-diol	37996-40-0

TABLE VIII
C₃C₇DIOL ALKOXYLATED DERIVATIVES

In the following tables, "EO" means polyethoxylates, i.e., $-(CH_2CH_2O)_nH$; Me-En means methyl-capped polyethoxylates $-(CH_2CH_2O)_nCH_3$; "2(Me-En)" means 2 Me-En groups needed; "PO" means polypropoxylates, $-(CH(CH_3)CH_2O)_nH$; "BO" means polybutyleneoxy groups, $(CH(CH_2CH_3)CH_2O)_nH$; and "n-BO" means poly(n-butyleneoxy) or poly(tetramethylene)oxy groups $-(CH_2CH_2CH_2CH_2O)_nH$. The indicated alkoxyated derivatives are all operable and those that are preferred are in bold type and listed on the second line. Non-limiting, typical synthesis methods to prepare the alkoxyated derivatives are given hereinafter.

TABLE VIIIA

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	2(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-propanediol (C3)	57-55-6			1-4 3-4	4		
1,2-propanediol, 2-methyl- (C4)	558-43-0		4-10 8-10	1	3		1
1,3-propanediol (C3)	504-63-2			6-8 8	5-6 6		
1,3-propanediol, 2,2-diethyl- (C7)	115-76-4	1-7 4-7			1	1-2 2	
1,3-propanediol, 2,2-dimethyl- (C5)	126-30-7			1-2	3-4 4		
1,3-propanediol, 2-(1-methylpropyl)- (C7)	33673-01-7	1-7 4-7			1	1-2 2	
1,3-propanediol, 2-(2-methylpropyl)- (C7)	26462-20-8	1-7 4-7			1	1-2 2	
1,3-propanediol, 2-ethyl- (C5)	2612-29-5		6-10 9-10	1	3		
1,3-propanediol, 2-ethyl-2-methyl- (C6)	77-84-9		1-6 3-6		2		1
1,3-propanediol, 2-isopropyl- (C6)	2612-27-3		1-6 3-6		2		1

1,3-propanediol, 2-methyl- (C4)	2163-42-0			2-5 4-5	4-5 5		2
1,3-propanediol, 2-methyl-2-isopropyl- (C7)	2109-23-1	2-9 6-9			1	1-3 2-3	
1,3-propanediol, 2-methyl-2-propyl- (C7)	78-26-2	1-7 4-7			1	1-2 2	
1,3-propanediol, 2-propyl- (C6)	2612-28-4		1-4		2		1

(a) The number of indicated alkoxyated groups in this and following Tables VIII are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituent in each derivative.

(d) The numbers in this column are average numbers of (CH₂CH₂O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.

(e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.

(g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIIIB

Base Material ^(a)	Base Material CAS No.	EO's	1(Me-En)	2(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-butanediol (C4)	584-03-2		2-8 6-8		2-3		1
1,2-butanediol, 2,3-dimethyl- (C6)	66553-15-9	1-6 2-5				1-2 1	
1,2-butanediol, 2-ethyl- (C6)	66553-16-0	1-3				1	
1,2-butanediol, 2-methyl- (C5)	41051-72-3		1-2		1		
1,2-butanediol, 3,3-dimethyl- (C6)	59562-82-2	1-6 2-5				1-2 1	
1,2-butanediol, 3-methyl- (C5)	50468-22-9		1-2		1		
1,3-butanediol (C4)	107-88-0			3-6 5-6	5		2

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1,3-butanediol, 2, 2,3-trimethyl- (C7)	16343-75-2		1-3		1-2 2		
1,3-butanediol, 2, 2-dimethyl- (C6)	76-35-7		3-8 6-8		3		
1,3-butanediol, 2,3-dimethyl- (C6)	24893-35-4		3-8 6-8		3		
1,3-butanediol, 2-ethyl- (C6)	66553-17-1		1-6 4-6		2 to 3		1
1,3-butanediol, 2-ethyl-2-methyl- (C7)	Method C		1		1	2-4 3	
1,3-butanediol, 2-ethyl-3-methyl- (C7)	68799-03-1		1		1	2-4 3	
1,3-butanediol, 2-isopropyl- (C7)	66567-04-2		1		1	2-4 3	
1,3-butanediol, 2-methyl- (C5)	684-84-4			1-3 2-3	4		
1,3-butanediol, 2-propyl- (C7)	66567-03-1	2-9 6-8			1	1-3 2-3	
1,3-butanediol, 3-methyl- (C5)	2568-33-4			1-3 2-3	4		
1,4-butanediol (C4)	110-63-4			2-4 3-4	4-5 4-5		2
1,4-butanediol, 2, 2,3-trimethyl- (C7)	162108-60-3	2-9 6-9			1	1-3 2-3	
1,4-butanediol, 2,2-dimethyl- (C6)	32812-23-0		1-6 3-6		2		1
1,4-butanediol, 2,3-dimethyl- (C6)	57716-80-0		1-6 3-6		2		1
1,4-butanediol, 2-ethyl- (C6)	57716-79-7		1-4		2		1
1,4-butanediol, 2-ethyl-2-methyl- (C7)	76651-98-4	1-7 4-7			1	1-2 2	
1,4-butanediol, 2-ethyl-3-methyl- (C7)	66225-34-1	1-7 4-7			1	1-2 2	
1,4-butanediol, 2-isopropyl- (C7)	39497-66-0	1-7 4-7			1	1-2 2	
1,4-butanediol, 2-methyl- (C5)	2938-98-9		6-10 9-10	1	3		1
1,4-butanediol, 2-propyl- (C7)	62946-68-3	1-5 2-5				1-2 1	
1,4-butanediol, 3-ethyl-1-methyl- (C7)	Method F	2-9 6-8			1	1-3 2-3	
2,3-butanediol (C4)	513-85-9		6-10 9-10	1	3-4		1
2,3-butanediol, 2,3-dimethyl- (C6)	76-09-5	3-9 7-9			1	1-3 2-3	

2,3-butanediol, 2-methyl- (C5)	5396-58-7		1-5 2-5		2		1
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(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

5 (b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(d) The numbers in this column are average numbers of (CH₂CH₂O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.

10 (e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.

15 (g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIIC

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	2(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-pentanediol (C5)	5343-92-0	3-10 7-10			1	2-3 3	
1,2-pentanediol, 2-methyl- (C6)	20667-05-4	1-3				1	
1,2-pentanediol, 3-methyl- (C6)	159623-53-7	1-3				1	
1,2-pentanediol, 4-methyl- (C6)	72110-08-8	1-3				1	
1,3-pentanediol (C5)	3174-67-2			1-2	3-4		
1,3-pentanediol, 2,2-dimethyl- (C7)	2157-31-5		1		1	2-4 3	
1,3-pentanediol, 2,3-dimethyl- (C7)	66225-52-3		1		1	2-4 3	
1,3-pentanediol, 2,4-dimethyl- (C7)	60712-38-1		1		1	2-4 3	
1,3-pentanediol, 2-ethyl- (C7)	29887-11-4	2-9 6-8			1	1-3 2-3	
1,3-pentanediol, 2-methyl- (C6)	149-31-5		1-6 4-6		2-3		1
1,3-pentanediol, 3,4-dimethyl- (C7)	129851-50-9		1		1	2-4 3	

1,3-pentanediol, 3-methyl- (C6)	33879-72-0		1-6 4-6		2-3		1
1,3-pentanediol, 4,4-dimethyl- (C7)	30458-16-3		1		1	2-4 3	
1,3-pentanediol, 4-methyl- (C6)	54876-99-2		1-6 4-6		2-3		1
1,4-pentanediol (C5)	626-95-9			1-2	3-4		
1,4-pentanediol, 2,2-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2,3-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2,4-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2-methyl- (C6)	6287-17-8		1-6 4-6		2-3		1
1,4-pentanediol, 3,3-dimethyl- (C7)	81887-62-9		1		1	2-4 3	
1,4-pentanediol, 3,4-dimethyl- (C7)	63521-36-8		1		1	2-4 3	
1,4-pentanediol, 3-methyl- (C6)	26787-63-3		1-6 4-6		2-3		1
1,4-pentanediol, 4-methyl- (C6)	1462-10-8		1-6 4-6		2-3		1
1,5-pentanediol (C5)	111-29-5		4-10 8-10	1	3		
1,5-pentanediol, 2,2-dimethyl- (C7)	3121-82-2	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2,3-dimethyl- (C7)	81554-20-3	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2,4-dimethyl- (C7)	2121-69-9	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2-ethyl- (C7)	14189-13-0	1-5 2-5				1-2 1	
1,5-pentanediol, 2-methyl- (C6)	42856-62-2		1-4		2		
1,5-pentanediol, 3,3-dimethyl- (C7)	53120-74-4	1-7 4-7			1	1-2 2	
1,5-pentanediol, 3-methyl- (C6)	4457-71-0		1-4		2		
2,3-pentanediol (C5)	42027-23-6		1-3		2		
2,3-pentanediol, 2-methyl- (C6)	7795-80-4	1-7 4-7			1	1-2 2	
2,3-pentanediol, 3-methyl- (C6)	63521-37-9	1-7 4-7			1	1-2 2	

2,3-pentanediol, 4-methyl- (C6)	7795-79-1	1-7 4-7			1	1-2 2	
2,4-pentanediol (C5)	625-69-4			1-4 2-4	4		
2,4-pentanediol, 2,3-dimethyl- (C7)	24893-39-8		1-4 2-4		2		
2,4-pentanediol, 2,4-dimethyl- (C7)	24892-49-7		1-4 2-4		2		
2,4-pentanediol, 2-methyl- (C6)	107-41-5		5-10 8-10		3		
2,4-pentanediol, 3,3-dimethyl- (C7)	24892-50-0		1-4 2-4		2		
2,4-pentanediol, 3-methyl- (C6)	Method H		5-10 8-10		3		

(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(d) The numbers in this column are average numbers of (CH₂CH₂O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.

(e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.

(g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIIID

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(e)	(f)	(g)
1,3-hexanediol (C6)	21531-91-9		1-5 2-5	2		1
1,3-hexanediol, 2-methyl- (C7)	66072-21-7	2-9 6-8		1	1-3 2-3	1
1,3-hexanediol, 3-methyl- (C7)	Method D	2-9 6-8		1	1-3 2-3	
1,3-hexanediol, 4-methyl- (C7)	Method C	2-9 6-8		1	1-3 2-3	
1,3-hexanediol, 5-methyl- (C7)	109863-14-1	2-9 6-8		1	1-3 2-3	

1,4-hexanediol (C6)	16432-53-4		1-5 2-5	2		1
1,4-hexanediol, 2-methyl- (C7)	Method F	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 3-methyl- (C7)	66225-36-3	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 4-methyl- (C7)	40646-08-0	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 5-methyl- (C7)	38624-36-1	2-9 6-8		1	1-3 2-3	
1,5-hexanediol (C6)	928-40-5		1-5 2-5	2		1
1,5-hexanediol, 2-methyl- (C7)	Method F	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 3-methyl- (C7)	Method F	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 4-methyl- (C7)	66225-37-4	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 5-methyl- (C7)	1462-11-9	2-9 6-8		1	1-3 2-3	
1,6-hexanediol (C6)	629-11-8		1-2	1-2	4	
1,6-hexanediol, 2-methyl- (C7)	25258-92-8	1-5 2-5			1-2 1	
1,6-hexanediol, 3-methyl- (C7)	4089-71-8	1-5 2-5			1-2 1	
2,3-hexanediol (C6)	617-30-1	1-5 2-5			1-2 1	
2,4-hexanediol (C6)	19780-90-6		3-8 5-8	3		
2,4-hexanediol, 2-methyl- (C7)	66225-35-2		1-2	1-2		
2,4-hexanediol, 3-methyl- (C7)	116530-79-1		1-2	1-2		
2,4-hexanediol, 4-methyl- (C7)	38836-25-8		1-2	1-2		
2,4-hexanediol, 5-methyl- (C7)	54877-00-8		1-2	1-2		
2,5-hexanediol (C6)	2935-44-6		3-8 5-8	3		
2,5-hexanediol, 2-methyl- (C7)	29044-06-2		1-2	1-2		
2,5-hexanediol, 3-methyl- (C7)	Method H		1-2	1-2		
3,4-hexanediol (C6)	922-17-8	1-5 2-5			1	

(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.

(g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIII

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	PO's	n-BO's
		(b)	(c)	(e)	(f)
1,3-heptanediol (C7)	23433-04-7	1-7 3-6		1	1-2 2
1,4-heptanediol (C7)	40646-07-9	1-7 3-6		1	1-2 2
1,5-heptanediol (C7)	60096-09-5	1-7 3-6		1	1-2 2
1,6-heptanediol (C7)	13175-27-4	1-7 3-6		1	1-2 2
1,7-heptanediol (C7)	629-30-1	1-2			1
2,4-heptanediol (C7)	20748-86-1	3-10 7-10	1	1	3
2,5-heptanediol (C7)	70444-25-6	3-10 7-10	1	1	3
2,6-heptanediol (C7)	5969-12-0	3-10 7-10	1	1	3
3,5-heptanediol (C7)	86632-40-8	3-10 7-10	1	1	3

(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(e) The numbers in this column are average numbers of $(\text{CH}(\text{CH}_3)\text{CH}_2\text{O})$ groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of $(\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{O})$ groups in the polytetramethyleneoxylated derivative.

5

Table IX
AROMATIC DIOLS

Suitable aromatic diols include:

10	Chemical Name	CAS No.
	<u>Operable Aromatic Diols</u>	
	1-phenyl-1,2-ethanediol	93-56-1
15	1-phenyl-1,2-propanediol	1855-09-0
	2-phenyl-1,2-propanediol	87760-50-7
	3-phenyl-1,2-propanediol	17131-14-5
	1-(3-methylphenyl)-1,3-propanediol	51699-43-5
	1-(4-methylphenyl)-1,3-propanediol	159266-06-5
20	2-methyl-1-phenyl-1,3-propanediol	139068-60-3
	1-phenyl-1,3-butanediol	118100-60-0
	3-phenyl-1,3-butanediol	68330-54-1
	1-phenyl-1,4-butanediol	136173-88-1
	2-phenyl-1,4-butanediol	95840-73-6
25	1-phenyl-2,3-butanediol	169437-68-7
	<u>Preferred Aromatic Diols</u>	
	<i>1-phenyl-1,2-ethanediol</i>	<i>93-56-1</i>
30	<i>1-phenyl-1,2-propanediol</i>	<i>1855-09-0</i>
	<i>2-phenyl-1,2-propanediol</i>	<i>87760-50-7</i>
	<i>3-phenyl-1,2-propanediol</i>	<i>17131-14-5</i>
	<i>1-(3-methylphenyl)-1,3-propanediol</i>	<i>51699-43-5</i>
	<i>1-(4-methylphenyl)-1,3-propanediol</i>	<i>159266-06-5</i>
35	<i>2-methyl-1-phenyl-1,3-propanediol</i>	<i>139068-60-3</i>
	<i>1-phenyl-1,3-butanediol</i>	<i>118100-60-0</i>
	<i>3-phenyl-1,3-butanediol</i>	<i>68330-54-1</i>
	<i>1-phenyl-1,4-butanediol</i>	<i>136173-88-1</i>
40	<u>More Preferred Aromatic Diols</u>	
	1-phenyl-1,2-propanediol	1855-09-0
	2-phenyl-1,2-propanediol	87760-50-7
	3-phenyl-1,2-propanediol	17131-14-5

	1-(3-methylphenyl)-1,3-propanediol	51699-43-5
	1-(4-methylphenyl)-1,3-propanediol	159266-06-5
	2-methyl-1-phenyl-1,3-propanediol	139068-60-3
	3-phenyl-1,3-butanediol	68330-54-1
5	1-phenyl-1,4-butanediol	136173-88-1

Inoperable Aromatic Diols

	1-phenyl-1,3-propanediol	
10	2-phenyl-1,3-propanediol	
	1-phenyl-1,2-butanediol	154902-08-6
	2-phenyl-1,2-butanediol	157008-55-4
	3-phenyl-1,2-butanediol	141505-72-8
	4-phenyl-1,2-butanediol	143615-31-0
15	2-phenyl-1,3-butanediol	103941-94-2
	4-phenyl-1,3-butanediol	81096-91-5
	2-phenyl-2,3-butanediol	138432-94-7

X. principal solvents which are homologs, or analogs, of the above structures where the total number of hydrogen atoms is increased by the addition of one, or more additional CH₂ groups, the total number of hydrogen atoms being kept at the same number by introducing double bonds, are also useful with examples including the following known compounds:

TABLE X EXAMPLES OF UNSATURATED COMPOUNDS

Operable Unsaturated Diols

	1,3-Propanediol, 2,2-di-2-propenyl-	55038-13-6
30	1,3-Propanediol, 2-(1-pentenyl)-	138436-18-7
	1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-	121887-76-1
	1,3-Propanediol, 2-(3-methyl-1-butenyl)-	138436-17-6
	1,3-Propanediol, 2-(4-pentenyl)-	73012-46-1
	1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-	91367-61-2
35	1,3-Propanediol, 2-ethyl-2-(2-propenyl)-	27606-26-4
	1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-	132130-95-1
	1,3-Butanediol, 2,2-diallyl-	103985-49-5
	1,3-Butanediol, 2-(1-ethyl-1-propenyl)-	116103-35-6
40	1,3-Butanediol, 2-(2-butenyl)-2-methyl-	92207-83-5
	1,3-Butanediol, 2-(3-methyl-2-butenyl)-	98955-19-2
	1,3-Butanediol, 2-ethyl-2-(2-propenyl)-	122761-93-7
	1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-	141585-58-2

	1,4-Butanediol, 2,3-bis(1-methylethylidene)-	52127-63-6
	1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-	115895-78-8
	2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-	91154-01-7
	2-Butene-1,4-diol, 2-(1-methylpropyl)-	91154-00-6
5	2-Butene-1,4-diol, 2-butyl-	153943-66-9
	1,3-Pentanediol, 2-ethenyl-3-ethyl-	104683-37-6
	1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-	143447-08-9
	1,4-Pentanediol, 3-methyl-2-(2-propenyl)-	139301-86-3
10	1,5-Pentanediol, 2-(1-propenyl)-	84143-44-2
	1,5-Pentanediol, 2-(2-propenyl)-	134757-01-0
	1,5-Pentanediol, 2-ethylidene-3-methyl-	42178-93-8
	1,5-Pentanediol, 2-propylidene-	58203-50-2
	2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-	88610-19-9
15	4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-	109788-04-7
	4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-	90676-97-4
	1,4-Hexanediol, 4-ethyl-2-methylene-	66950-87-6
	1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-	18984-03-7
20	1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-	18927-12-3
	1,5-Hexanediol, 2-(1-methylethenyl)-	96802-18-5
	1,6-Hexanediol, 2-ethenyl-	66747-31-7
	1-Hexene-3,4-diol, 5,5-dimethyl-	169736-29-2
	1-Hexene-3,4-diol, 5,5-dimethyl-	120191-04-0
25	2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-	70101-76-7
	3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-	112763-52-7
	3-Hexene-1,6-diol, 2-ethyl-	84143-45-3
	3-Hexene-1,6-diol, 3,4-dimethyl-	125032-66-8
	4-Hexene-2,3-diol, 2,5-dimethyl-	13295-61-9
30	4-Hexene-2,3-diol, 3,4-dimethyl-	135367-17-8
	5-Hexene-1,3-diol, 3-(2-propenyl)-	74693-24-6
	5-Hexene-2,3-diol, 2,3-dimethyl-	154386-00-2
	5-Hexene-2,3-diol, 3,4-dimethyl-	135096-13-8
	5-Hexene-2,3-diol, 3,5-dimethyl-	134626-63-4
35	5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-	155751-24-9
	1,4-Heptanediol, 6-methyl-5-methylene-	100590-29-2
	1,5-Heptadiene-3,4-diol, 2,3-dimethyl-	18927-06-5
	1,5-Heptadiene-3,4-diol, 2,5-dimethyl-	22607-16-5
40	1,5-Heptadiene-3,4-diol, 3,5-dimethyl-	18938-51-7
	1,7-Heptanediol, 2,6-bis(methylene)-	139618-24-9
	1,7-Heptanediol, 4-methylene-	71370-08-6
	1-Heptene-3,5-diol, 2,4-dimethyl-	155932-77-7
	1-Heptene-3,5-diol, 2,6-dimethyl-	132157-35-8

	1-Heptene-3,5-diol, 3-ethenyl-5-methyl	61841-10-9
	1-Heptene-3,5-diol, 6,6-dimethyl-	109788-01-4
	2,4-Heptadiene-2,6-diol, 4,6-dimethyl-	102605-95-8
	2,5-Heptadiene-1,7-diol, 4,4-dimethyl-	162816-19-5
5	2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-	115346-30-0
	2-Heptene-1,4-diol, 5,6-dimethyl-	103867-76-1
	2-Heptene-1,5-diol, 5-ethyl-	104683-39-8
	2-Heptene-1,7-diol, 2-methyl-	74868-68-1
	3-Heptene-1,5-diol, 4,6-dimethyl-	147028-45-3
10	3-Heptene-1,7-diol, 3-methyl-6-methylene-	109750-55-2
	3-Heptene-2,5-diol, 2,4-dimethyl-	98955-40-9
	3-Heptene-2,5-diol, 2,5-dimethyl-	24459-23-2
	3-Heptene-2,6-diol, 2,6-dimethyl-	160524-66-3
	3-Heptene-2,6-diol, 4,6-dimethyl-	59502-66-8
15	5-Heptene-1,3-diol, 2,4-dimethyl-	123363-69-9
	5-Heptene-1,3-diol, 3,6-dimethyl-	96924-52-6
	5-Heptene-1,4-diol, 2,6-dimethyl-	106777-98-4
	5-Heptene-1,4-diol, 3,6-dimethyl-	106777-99-5
	5-Heptene-2,4-diol, 2,3-dimethyl-	104651-56-1
20	6-Heptene-1,3-diol, 2,2-dimethyl-	140192-39-8
	6-Heptene-1,4-diol, 4-(2-propenyl)-	1727-87-3
	6-Heptene-1,4-diol, 5,6-dimethyl-	152344-16-6
	6-Heptene-1,5-diol, 2,4-dimethyl-	74231-27-9
	6-Heptene-1,5-diol, 2-ethylidene-6-methyl-	91139-73-0
25	6-Heptene-2,4-diol, 4-(2-propenyl)-	101536-75-8
	6-Heptene-2,4-diol, 5,5-dimethyl-	98753-77-6
	6-Heptene-2,5-diol, 4,6-dimethyl-	134876-94-1
	6-Heptene-2,5-diol, 5-ethenyl-4-methyl-	65757-31-5
30	1,3-Octanediol, 2-methylene-	108086-78-8
	1,6-Octadiene-3,5-diol, 2,6-dimethyl-	91140-06-6
	1,6-Octadiene-3,5-diol, 3,7-dimethyl-	75654-19-2
	1,7-Octadiene-3,6-diol, 2,6-dimethyl-	51276-33-6
	1,7-Octadiene-3,6-diol, 2,7-dimethyl-	26947-10-4
35	1,7-Octadiene-3,6-diol, 3,6-dimethyl-	31354-73-1
	1-Octene-3,6-diol, 3-ethenyl-	65757-34-8
	2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-	162648-63-7
	2,4-Octadiene-1,7-diol, 3,7-dimethyl-	136054-24-5
	2,5-Octadiene-1,7-diol, 2,6-dimethyl-	91140-07-7
40	2,5-Octadiene-1,7-diol, 3,7-dimethyl-	117935-59-8
	2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol)	101391-01-9
	2,6-Octadiene-1,8-diol, 2-methyl-	149112-02-7
	2,7-Octadiene-1,4-diol, 3,7-dimethyl-	91140-08-8
	2,7-Octadiene-1,5-diol, 2,6-dimethyl-	91140-09-9

	2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool)	103619-06-3
	2,7-Octadiene-1,6-diol, 2,7-dimethyl-	60250-14-8
	2-Octene-1,4-diol	40735-15-7
	2-Octene-1,7-diol	73842-95-2
5	2-Octene-1,7-diol, 2-methyl-6-methylene-	91140-16-8
	3,5-Octadiene-1,7-diol, 3,7-dimethyl-	62875-09-6
	3,5-Octadiene-2,7-diol, 2,7-dimethyl-	7177-18-6
	3,5-Octanediol, 4-methylene-	143233-15-2
	3,7-Octadiene-1,6-diol, 2,6-dimethyl-	127446-29-1
10	3,7-Octadiene-2,5-diol, 2,7-dimethyl-	171436-39-8
	3,7-Octadiene-2,6-diol, 2,6-dimethyl-	150283-67-3
	3-Octene-1,5-diol, 4-methyl-	147028-43-1
	3-Octene-1,5-diol, 5-methyl-	19764-77-3
	4,6-Octadiene-1,3-diol, 2,2-dimethyl-	39824-01-6
15	4,7-Octadiene-2,3-diol, 2,6-dimethyl-	51117-38-5
	4,7-Octadiene-2,6-diol, 2,6-dimethyl-	59076-71-0
	4-Octene-1,6-diol, 7-methyl-	84538-24-9
	4-Octene-1,8-diol, 2,7-bis(methylene)-	109750-56-3
	4-Octene-1,8-diol, 2-methylene-	109750-58-5
20	5,7-Octadiene-1,4-diol, 2,7-dimethyl-	105676-78-6
	5,7-Octadiene-1,4-diol, 7-methyl-	105676-80-0
	5-Octene-1,3-diol	130272-38-7
	6-Octene-1,3-diol, 7-methyl-	110971-19-2
	6-Octene-1,4-diol, 7-methyl-	152715-87-2
25	6-Octene-1,5-diol	145623-79-6
	6-Octene-1,5-diol, 7-methyl-	116214-61-0
	6-Octene-3,5-diol, 2-methyl-	65534-66-9
	6-Octene-3,5-diol, 4-methyl-	156414-25-4
	7-Octene-1,3-diol, 2-methyl-	155295-38-8
30	7-Octene-1,3-diol, 4-methyl-	142459-25-4
	7-Octene-1,3-diol, 7-methyl-	132130-96-2
	7-Octene-1,5-diol	7310-51-2
	7-Octene-1,6-diol	159099-43-1
	7-Octene-1,6-diol, 5-methyl-	144880-56-8
35	7-Octene-2,4-diol, 2-methyl-6-methylene-	72446-81-2
	7-Octene-2,5-diol, 7-methyl-	152344-12-2
	7-Octene-3,5-diol, 2-methyl-	98753-85-6
	1-Nonene-3,5-diol	119554-56-2
40	1-Nonene-3,7-diol	23866-97-9
	3-Nonene-2,5-diol	165746-84-9
	4,6-Nonadiene-1,3-diol, 8-methyl-	124099-52-1
	4-Nonene-2,8-diol	154600-80-3
	6,8-Nonadiene-1,5-diol	108586-03-4

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	7-Nonene-2,4-diol	30625-41-3
	8-Nonene-2,4-diol	119785-59-0
	8-Nonene-2,5-diol	132381-58-9
5	1,9-Decadiene-3,8-diol	103984-04-9
	1,9-Decadiene-4,6-diol	138835-67-3
<u>Preferred Unsaturated Diols</u>		
	<i>1,3-Butanediol, 2,2-diallyl-</i>	<i>103985-49-5</i>
10	<i>1,3-Butanediol, 2-(1-ethyl-1-propenyl)-</i>	<i>116103-35-6</i>
	<i>1,3-Butanediol, 2-(2-butenyl)-2-methyl-</i>	<i>92207-83-5</i>
	<i>1,3-Butanediol, 2-(3-methyl-2-butenyl)-</i>	<i>98955-19-2</i>
	<i>1,3-Butanediol, 2-ethyl-2-(2-propenyl)-</i>	<i>122761-93-7</i>
	<i>1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-</i>	<i>141585-58-2</i>
15	<i>1,4-Butanediol, 2,3-bis(1-methylethylidene)-</i>	<i>52127-63-6</i>
	<i>1,3-Pentanediol, 2-ethenyl-3-ethyl-</i>	<i>104683-37-6</i>
	<i>1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-</i>	<i>143447-08-9</i>
	<i>1,4-Pentanediol, 3-methyl-2-(2-propenyl)-</i>	<i>139301-86-3</i>
20	<i>4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-</i>	<i>109788-04-7</i>
	<i>4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-</i>	<i>90676-97-4</i>
	<i>1,4-Hexanediol, 4-ethyl-2-methylene-</i>	<i>66950-87-6</i>
	<i>1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-</i>	<i>18984-03-7</i>
25	<i>1,5-Hexanediol, 2-(1-methylethenyl)-</i>	<i>96802-18-5</i>
	<i>2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-</i>	<i>70101-76-7</i>
	<i>1,4-Heptanediol, 6-methyl-5-methylene-</i>	<i>100590-29-2</i>
	<i>2,4-Heptadiene-2,6-diol, 4,6-dimethyl-</i>	<i>102605-95-8</i>
30	<i>2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-</i>	<i>115346-30-0</i>
	<i>2-Heptene-1,4-diol, 5,6-dimethyl-</i>	<i>103867-76-1</i>
	<i>3-Heptene-1,5-diol, 4,6-dimethyl-</i>	<i>147028-45-3</i>
	<i>5-Heptene-1,3-diol, 2,4-dimethyl-</i>	<i>123363-69-9</i>
	<i>5-Heptene-1,3-diol, 3,6-dimethyl-</i>	<i>96924-52-6</i>
35	<i>5-Heptene-1,4-diol, 2,6-dimethyl-</i>	<i>106777-98-4</i>
	<i>5-Heptene-1,4-diol, 3,6-dimethyl-</i>	<i>106777-99-5</i>
	<i>6-Heptene-1,3-diol, 2,2-dimethyl-</i>	<i>140192-39-8</i>
	<i>6-Heptene-1,4-diol, 5,6-dimethyl-</i>	<i>152344-16-6</i>
	<i>6-Heptene-1,5-diol, 2,4-dimethyl-</i>	<i>74231-27-9</i>
40	<i>6-Heptene-1,5-diol, 2-ethylidene-6-methyl-</i>	<i>91139-73-0</i>
	<i>6-Heptene-2,4-diol, 4-(2-propenyl)-</i>	<i>101536-75-8</i>
	<i>1-Octene-3,6-diol, 3-ethenyl-</i>	<i>65757-34-8</i>
	<i>2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-</i>	<i>162648-63-7</i>

	2,5-Octadiene-1,7-diol, 2,6-dimethyl-	91140-07-7
	2,5-Octadiene-1,7-diol, 3,7-dimethyl-	117935-59-8
	2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol)	101391-01-9
	2,6-Octadiene-1,8-diol, 2-methyl-	149112-02-7
5	2,7-Octadiene-1,4-diol, 3,7-dimethyl-	91140-08-8
	2,7-Octadiene-1,5-diol, 2,6-dimethyl-	91140-09-9
	2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool)	103619-06-3
	2,7-Octadiene-1,6-diol, 2,7-dimethyl-	60250-14-8
	2-Octene-1,7-diol, 2-methyl-6-methylene-	91140-16-8
10	3,5-Octadiene-2,7-diol, 2,7-dimethyl-	7177-18-6
	3,5-Octanediol, 4-methylene-	143233-15-2
	3,7-Octadiene-1,6-diol, 2,6-dimethyl-	127446-29-1
	4-Octene-1,8-diol, 2-methylene-	109750-58-5
	6-Octene-3,5-diol, 2-methyl-	65534-66-9
15	6-Octene-3,5-diol, 4-methyl-	156414-25-4
	7-Octene-2,4-diol, 2-methyl-6-methylene-	72446-81-2
	7-Octene-2,5-diol, 7-methyl-	152344-12-2
	7-Octene-3,5-diol, 2-methyl-	98753-85-6
20	1-Nonene-3,5-diol	119554-56-2
	1-Nonene-3,7-diol	23866-97-9
	3-Nonene-2,5-diol	165746-84-9
	4-Nonene-2,8-diol	154600-80-3
	6,8-Nonadiene-1,5-diol	108586-03-4
25	7-Nonene-2,4-diol	30625-41-3
	8-Nonene-2,4-diol	119785-59-0
	8-Nonene-2,5-diol	132381-58-9
	1,9-Decadiene-3,8-diol	103984-04-9

1,9-Decadiene-4,6-diol

138835-67-3

; and

XI. mixtures thereof.

There are no C₁₋₂ mono-ols that provide a clear concentrated fabric softener compositions in the context of this invention. There is only one C₃ mono-ol, n-propanol, that provides acceptable performance in terms of forming a clear product and either keeping it clear to a temperature of about 20°C, or allowing it to recover upon rewarming to room temperature, although its boiling point is undesirably low. Of the C₄ mono-ols, only 2-butanol and 2-methyl-2-propanol provide very good performance, but 2-methyl-2-propanol has a boiling point that is undesirably low. There are no C₅₋₆ mono-ols that provide clear products except for unsaturated mon-ols as described above and hereinafter.

It is found that some principal solvents which have two hydroxyl groups in their chemical formulas are suitable for use in the formulation of the liquid concentrated, clear fabric softener compositions of this invention. It is discovered that the suitability of each principal solvent is surprisingly very selective, dependent on the number of carbon atoms, the isomeric configuration of the molecules having the same number of carbon atoms, the degree of unsaturation, etc. Principal solvents with similar solubility characteristics to the principal solvents above and possessing at least some asymmetry will provide the same benefit. It is discovered that the suitable principal solvents have a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60.

For example, for the 1,2-alkanediol principal solvent series having the general formula HO-CH₂-CHOH-(CH₂)_n-H, with n being from 1 to 8, only 1,2-hexanediol (n=4), which has a ClogP value of about 0.53, which is within the effective ClogP range of from about 0.15 to about 0.64, is a good principal solvent, and is within the claim of this invention, while the others, e.g., 1,2-propanediol, 1,2-butanediol, 1,2-pentanediol, 1,2-octanediol, 1,2-decanediol, having ClogP values outside the effective 0.15 - 0.64 range, are not. Furthermore, of the hexanediol isomers, again, the 1,2-hexanediol is a good principal solvent, while many other isomers such as 1,3-hexanediol, 1,4-hexanediol, 1,5-hexanediol, 1,6-hexanediol, 2,4-hexanediol, and 2,5-hexanediol, having ClogP values outside the effective 0.15 - 0.64 range, are not. These are illustrated by the Examples and Comparative Examples I-A and I-B (vide infra).

There are no C₃-C₅ diols that provide a clear concentrated composition in the context of this invention.

Although there are many C₆ diols that are possible isomers, only the ones listed above are suitable for making clear products and only: 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and 1,2-hexanediol are preferred, of which the most preferred are: 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and 1,2-hexanediol.

There are more possible C₇ diol isomers, but only the listed ones provide clear products and the preferred ones are: 1,3-butanediol, 2-butyl-; 1,4-butanediol, 2-propyl-; 1,5-pentanediol, 2-ethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; 1,6-heptanediol; of which the most preferred are: 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; and 3,4-pentanediol, 2,3-dimethyl-.

Similarly, there are even more C₈ diol isomers, but only the listed ones provide clear products and the preferred ones are: 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-

pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-
 5 pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-
 15 hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-
 20 heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-
 25 heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-
 30 heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol of which the following are the most preferred: 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-
 35 propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-;

- 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,3-pentanediol, 2,3,4-trimethyl-;
- 5 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol,
- 10 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-;
- 15 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-
- 20 dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-
- 25 heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-
- 30 heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-

heptanediol, 2-methyl-: 3,5-heptanediol, 4-methyl-: 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol.

Preferred mixtures of eight-carbon-atom-1,3 diols can be formed by the condensation of mixtures of butyraldehyde, isobutyraldehyde and/or methyl ethyl ketone (2-butanone), so long as there are at least two of these reactants in the reaction mixture, in the presence of highly alkaline catalyst followed by conversion by hydrogenation to form a mixture of eight-carbon-1,3-diols, i.e., a mixture of 8-carbon-1,3-diols primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2-dimethyl-2,4-hexanediol; 2-methyl-3,5-heptanediol; and/or 3-methyl-3,5-heptanediol, the level of 2,2,4-trimethyl-1,3-pentanediol being less than half of any mixture, possibly along with other minor isomers resulting from condensation on the methylene group of 2-butanone, when it is present, instead of on the methyl group.

The formulatability, and other properties, such as odor, fluidity, melting point lowering, etc., of some C₆₋₈ diols listed above in Tables II-IV which are not preferred, can be improved by polyalkoxylation. Also, some of the C₃₋₅ diols which are alkoxylation are preferred. Preferred alkoxylation derivatives of the above C₃₋₈ diols [In the following disclosure, "EO" means polyethoxylates, "E_n" means -(CH₂CH₂O)_nH; Me-E_n means methyl-capped polyethoxylates -(CH₂CH₂O)_nCH₃; "2(Me-En)" means 2 Me-En groups needed; "PO" means polypropoxylates, -(CH(CH₃)CH₂O)_nH; "BO" means polybutyleneoxy groups, (CH(CH₂CH₃)CH₂O)_nH; and "n-BO" means poly(n-butyleneoxy) groups -(CH₂CH₂CH₂CH₂O)_nH.] include:

1. 1,2-propanediol (C3) 2(Me-E₃₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₈₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,3-propanediol (C3) 2(Me-E₈); 1,3-propanediol (C3) PO₆; 1,3-propanediol, 2,2-diethyl- (C7) E₄₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₄₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₄₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₉₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂;

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- 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₄₋₅); 1,3-propanediol, 2-methyl- (C4) PO₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₆₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₂₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₄₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂;
2. 1,2-butanediol (C4) (Me E₆₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁;
- 10 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₅₋₆); 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₄₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₃; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₃; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₃; 1,3-butanediol, 2-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₆₋₈; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₂₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₃₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₆₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₂₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂;
- 30 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂;
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- 1,4-butanediol, 2-isopropyl- (C7) E₄₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₂; 1,4-butanediol, 2-methyl- (C5) (Me E₉₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-propyl- (C7) E₂₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₆₋₈; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₂₋₃; 2,3-butanediol (C4) (Me E₉₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol, 2,3-dimethyl- (C6) E₇₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) BO₂₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₂₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;
3. 1,2-pentanediol (C5) E₇₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2-ethyl- (C7) E₆₋₈; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2-methyl- (C6) (Me-E₄₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7)

- PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,5-pentanediol, (C5) (Me-E₈₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2-ethyl- (C7) E₂₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₄₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₂; 2,3-pentanediol, 3-methyl- (C6) E₄₋₇; 2,3-pentanediol, 3-methyl- (C6) n-BO₂; 2,3-pentanediol, 4-methyl- (C6) E₄₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₂; 2,4-pentanediol, (C5) 2(Me-E₂₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₈₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₈₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;
4. 1,3-hexanediol (C6) (Me-E₂₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₆₋₈; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 3-methyl- (C7) E₆₋₈; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 4-methyl- (C7) E₆₋₈; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 5-methyl- (C7) E₆₋₈; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol (C6) (Me-E₂₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₆₋₈; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 3-methyl- (C7) E₆₋₈; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 4-methyl- (C7) E₆₋₈; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 5-methyl- (C7) E₆₋

- g; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol (C6) (Me-E₂₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₆₋₈; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 3-methyl- (C7) E₆₋₈; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 4-methyl- (C7) E₆₋₈; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 5-methyl- (C7) E₆₋₈; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₂₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁; 1,6-hexanediol, 3-methyl- (C7) E₂₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁; 2,3-hexanediol (C6) E₂₋₅; 2,3-hexanediol (C6) n-BO₁; 2,4-hexanediol (C6) (Me-E₅₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₅₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₂₋₅; 3,4-hexanediol (C6) n-BO₁;
5. 1,3-heptanediol (C7) E₃₋₆; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₂; 1,4-heptanediol (C7) E₃₋₆; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₂; 1,5-heptanediol (C7) E₃₋₆; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₂; 1,6-heptanediol (C7) E₃₋₆; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₇₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₇₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₇₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₇₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;
6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-

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- dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-

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heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof.

Of the nonane isomers, only 2,4-pentadiol, 2,3,3,4-tetramethyl- is highly preferred.

In addition to the aliphatic diol principal solvents, and some of their alkoxyated derivatives, discussed hereinbefore and hereinafter, some specific diol ethers are also found to be suitable principal solvents for the formulation of liquid concentrated, clear fabric softener compositions of the present invention. Similar to the aliphatic diol principal solvents, it is discovered that the suitability of each principal solvent is very selective, depending, e.g., on the number of carbon atoms in the specific diol ether molecules. For example, as given in Table VI, for the glyceryl ether series having the formula HOCH₂-CHOH-CH₂-O-R, wherein R is from C₂ to C₈ alkyl, only monopentyl ethers with the formula HOCH₂-CHOH-CH₂-O-C₅H₁₁ (3-pentyloxy-1,2-propanediol), wherein the C₅H₁₁ group comprises different pentyl isomers, have ClogP values within the preferred ClogP values of from about 0.25 to about 0.62 and are suitable for the formulation of liquid concentrated, clear fabric softeners of the present invention. These are illustrated by the Examples and Comparative Examples XXXIIA-7 to XXXIIA-7F. It is also found that the cyclohexyl derivative, but not the cyclopentyl derivative, is suitable. Similarly, selectivity is exhibited in the selection of aryl glyceryl ethers. Of the many possible aromatic groups, only a few phenol derivatives are suitable.

The same narrow selectivity is also found for the di(hydroxyalkyl) ethers. It is discovered that bis(2-hydroxybutyl) ether, but not bis(2-hydroxypentyl) ether, is suitable. For the di(cyclic hydroxyalkyl) analogs, the bis(2-hydroxycyclopentyl) ether is suitable, but not the bis(2-hydroxycyclohexyl) ether. Non-limiting examples of synthesis methods for the preparation of some preferred di(hydroxyalkyl) ethers are given hereinafter.

The butyl monoglycerol ether (also named 3-butyloxy-1,2-propanediol) is not well suited to form liquid concentrated, clear fabric softeners of the present invention. However, its polyethoxylated derivatives, preferably from about triethoxylated to about nonaethoxylated, more preferably from pentaethoxylated to octaethoxylated, are suitable principal solvents, as given in Table VI.

All of the preferred alkyl glyceryl ethers and/or di(hydroxyalkyl)ethers that have been identified are given in Table VI and the most preferred are: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyl-1-oxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-1-oxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; and/or 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated. Preferred aromatic glyceryl ethers include: 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; and mixtures thereof. The more preferred aromatic glyceryl ethers include: 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-(2-phenylethyloxy)-; and mixtures thereof. The most preferred di(hydroxyalkyl)ethers include: bis(2-hydroxybutyl)ether; and bis(2-hydroxycyclopentyl)ether;

An illustrative and non-limiting example of synthesis methods to prepare the preferred alkyl and aryl monoglyceryl ethers is given hereinafter.

The alicyclic diols and their derivatives that are preferred include: (1) the saturated diols and their derivatives including: 1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-

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cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 2-hydroxymethylcyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; ; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxyate; 1,2-cyclohexanediol, dibutylenoxyate; and/or 1,2-cyclohexanediol, tributylenoxyate. The most preferred saturated alicyclic diols and their derivatives are: 1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1-hydroxy-cyclohexanemethanol; 1-methyl-1,2-cyclohexanediol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-cyclohexanediol; 1,2-cycloheptanediol; ; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol,

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octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; and/or 1,2-cyclohexanediol, dibutylenoxylate.

Preferred aromatic diols include: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; and/or 1-phenyl-1,4-butanediol, of which, 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; and/or 1-phenyl-1,4-butanediol are the most preferred.

As discussed hereinbefore, all of the unsaturated materials that are related to the other preferred principal solvents herein by the same relationship, i.e., having one more CH₂ group than the corresponding saturated principal solvent will also be preferred. However, the specific preferred unsaturated diol principal solvents are:

1,3-butanediol, 2,2-diallyl-; 1,3-butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-butanediol, 2-(2-butenyl)-2-methyl-; 1,3-butanediol, 2-(3-methyl-2-butenyl)-; 1,3-butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-butanediol, 2,3-bis(1-methylethylidene)-; 1,3-pentanediol, 2-ethenyl-3-ethyl-; 1,3-pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-pentanediol, 3-methyl-2-(2-propenyl)-; 4-pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-hexanediol, 4-ethyl-2-methylene-; 1,5-hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-hexanediol, 2-(1-methylethenyl)-; 2-hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 1,4-heptanediol, 6-methyl-5-methylene-; 2,4-heptadiene-2,6-diol, 4,6-dimethyl-; 2,6-heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-heptene-1,4-diol, 5,6-dimethyl-; 3-heptene-1,5-diol, 4,6-dimethyl-; 5-heptene-1,3-diol, 2,4-dimethyl-; 5-heptene-1,3-diol, 3,6-dimethyl-; 5-heptene-1,4-diol, 2,6-dimethyl-; 5-heptene-1,4-diol, 3,6-dimethyl-; 6-heptene-1,3-diol, 2,2-dimethyl-; 6-heptene-1,4-diol, 5,6-dimethyl-; 6-heptene-1,5-diol, 2,4-dimethyl-; 6-heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-heptene-2,4-diol, 4-(2-propenyl)-; 1-octene-3,6-diol, 3-ethenyl-; 2,4,6-octatriene-1,8-diol, 2,7-dimethyl-; 2,5-octadiene-1,7-diol, 2,6-dimethyl-; 2,5-octadiene-1,7-diol, 3,7-dimethyl-; 2,6-octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-octadiene-1,8-diol, 2-methyl-; 2,7-octadiene-1,4-diol, 3,7-dimethyl-; 2,7-octadiene-1,5-diol, 2,6-dimethyl-; 2,7-octadiene-1,6-diol, 2,6-dimethyl- (8-hydroxylinalool); 2,7-octadiene-1,6-diol, 2,7-dimethyl-; 2-octene-1,7-diol, 2-methyl-6-methylene-; 3,5-octadiene-2,7-diol, 2,7-dimethyl-; 3,5-octanediol, 4-methylene-; 3,7-octadiene-1,6-diol, 2,6-dimethyl-; 4-octene-1,8-diol, 2-methylene-; 6-octene-3,5-diol, 2-methyl-; 6-octene-

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3,5-diol, 4-methyl-, 7-octene-2,4-diol, 2-methyl-6-methylene-, 7-octene-2,5-diol, 7-methyl-, 7-octene-3,5-diol, 2-methyl-, 1-nonene-3,5-diol; 1-nonene-3,7-diol; 3-nonene-2,5-diol; 4-nonene-2,8-diol; 6,8-nonadiene-1,5-diol; 7-nonene-2,4-diol; 8-nonene-2,4-diol; 8-nonene-2,5-diol; 1,9-decadiene-3,8-diol; and/or 1,9-decadiene-4,6-diol.

5 Said principal alcohol solvent can also preferably be selected from the group consisting of: 2,5-dimethyl-2,5-hexanediol; 2-ethyl-1,3-hexanediol; 2-methyl-2-propyl-1,3-propanediol; 1,2-hexanediol; and mixtures thereof. More preferably said principal alcohol solvent is selected from the group consisting of 2-ethyl-1,3-hexanediol; 2-methyl-2-propyl-1,3-propanediol; 1,2-hexanediol; and mixtures thereof. Even more preferably,
10 said principal alcohol solvent is selected from the groups consisting of 2-ethyl-1,3-hexanediol; 1,2-hexanediol; and mixtures thereof.

When several derivatives of the same diol with different alkyleneoxy groups can be used, e.g., 2-methyl-2,3-butanediol having 3 to 5 ethyleneoxy groups, or 2 propyleneoxy groups, or 1 butyleneoxy group, it is preferred to use the derivative with the
15 lowest number of groups, i.e., in this case, the derivative with one butyleneoxy group. However, when only about one to about four ethyleneoxy groups are needed to provide good formulatability, such derivatives are also preferred.

UNSATURATED DIOLS

It is found surprisingly that there is a clear similarity between the acceptability
20 (formulatability) of a saturated diol and its unsaturated homologs, or analogs, having higher molecular weights. The unsaturated homologs/analogues have the same formulatability as the parent saturated principal solvent with the condition that the unsaturated principal solvents have one additional methylene (viz., CH₂) group for each double bond in the chemical formula. In other words, there is an apparent "addition rule"
25 in that for each good saturated principal solvent of this invention, which is suitable for the formulation of clear, concentrated fabric softener compositions, there are suitable unsaturated principal solvents where one, or more, CH₂ groups are added while, for each CH₂ group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen
30 atoms in the molecule constant with respect to the chemical formula of the "parent" saturated principal solvent. This is due to a surprising fact that adding a -CH₂- group to a solvent chemical formula has an effect of increasing its ClogP value by about 0.53, while removing two adjacent hydrogen atoms to form a double bond has an effect of decreasing its ClogP value by about a similar amount, viz., about 0.48, thus about compensating for
35 the -CH₂- addition. Therefore one goes from a preferred saturated principal solvent to the

preferred higher molecular weight unsaturated analogs/homologs containing at least one more carbon atom by inserting one double bond for each additional CH₂ group, and thus the total number of hydrogen atoms is kept the same as in the parent saturated principal solvent, as long as the ClogP value of the new solvent remains within the effective 0.15-0.64 range. The following are some illustrative examples:

2,2-Dimethyl-6-heptene-1,3-diol (CAS No. 140192-39-8) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-methyl-1,3-heptanediol or 2,2-dimethyl-1,3-hexanediol.

2,4-Dimethyl-5-heptene-1,3-diol (CAS No. 123363-69-9) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-methyl-1,3-heptanediol or 2,4-dimethyl-1,3-hexanediol.

2-(1-Ethyl-1-propenyl)-1,3-butanediol (CAS No. 116103-35-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-(1-ethylpropyl)-1,3-propanediol or 2-(1-methylpropyl)-1,3-butanediol.

2-Ethenyl-3-ethyl-1,3-pentanediol (CAS No. 104683-37-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 3-ethyl-2-methyl-1,3-pentanediol or 2-ethyl-3-methyl-1,3-pentanediol.

3,6-Dimethyl-5-heptene-1,4-diol (e.g., CAS No. 106777-99-5) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 3-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; or 3,5-dimethyl-1,4-hexanediol.

5,6-Dimethyl-6-heptene-1,4-diol (e.g., CAS No. 152344-16-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 5-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; or 4,5-dimethyl-1,3-hexanediol.

4-Methyl-6-octene-3,5-diol (CAS No. 156414-25-4) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 3,5-octanediol, 3-methyl-2,4-heptanediol or 4-methyl-3,5-heptanediol.

Rosiridol (CAS No. 101391-01-9) and isorosiridol (CAS No. 149252-15-3) are two isomers of 3,7-dimethyl-2,6-octadiene-1,4-diol, and are preferred C₁₀-diol principal

solvents. They can be considered to be derived by appropriately adding two CH₂ groups and two double bonds to any of the following preferred C8-diol principal solvents: 2-methyl-1,3-heptanediol; 6-methyl-1,3-heptanediol; 3-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; 2,5-dimethyl-1,3-hexanediol; or 3,5-dimethyl-1,4-hexanediol.

5 8-Hydroxylinalool (CAS No. 103619-06-3, 2,6-dimethyl-2,7-octadiene-1,6-diol) is a preferred C10-diol principal solvent and can be considered to be derived by appropriately adding two CH₂ groups and two double bonds to any of the following preferred C8-diol principal solvents: 2-methyl-1,5-heptanediol; 5-methyl-1,5-heptanediol; 2-methyl-1,6-heptanediol; 6-methyl-1,6-heptanediol; or 2,4-dimethyl-1,4-hexanediol.

10 2,7-Dimethyl-3,7-octadiene-2,5-diol (CAS No. 171436-39-8) is a preferred C10-diol principal solvent and can be considered to be derived by appropriately adding two CH₂ group and two double bond to any of the following preferred C8-diol principal solvents: 2,5-octanediol; 6-methyl-1,4-heptanediol; 2-methyl-2,4-heptanediol; 6-methyl-2,4-heptanediol; 2-methyl-2,5-heptanediol; 6-methyl-2,5-heptanediol; and 2,5-dimethyl-15 2,4-hexanediol.

4-Butyl-2-butene-1,4-diol (CAS No. 153943-66-9) is a preferred C8-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C7-diol principal solvents: 2-propyl-1,4-butanediol or 2-butyl-1,3-propanediol.

20 By the same token, there are cases where a higher molecular weight unsaturated homolog which is derived from a poor, inoperable saturated solvent is itself a poor solvent. For example, 3,5-dimethyl-5-hexene-2,4-diol (e.g., CAS No. 160429-40-3) is a poor unsaturated C8 solvent, and can be considered to be derived from the following poor saturated C7 solvents: 3-methyl-2,4-hexanediol; 5-methyl-2,4-hexanediol; or 2,4-25 dimethyl-1,3-pentanediol; and 2,6-dimethyl-5-heptene-1,2-diol (e.g., CAS No. 141505-71-7) is a poor unsaturated C9 solvent, and can be considered to be derived from the following poor saturated C8 solvents: 2-methyl-1,2-heptanediol; 6-methyl-1,2-heptanediol; or 2,5-dimethyl-1,2-hexanediol.

It is also found, surprisingly, that there is an exception to the above addition rule, 30 in which saturated principal solvents always have unsaturated analogs/homologs with the same degree of acceptability. The exception relates to saturated diol principal solvents having the two hydroxyl groups situated on two adjacent carbon atoms. In some cases, but not always, inserting one, or more, CH₂ groups between the two adjacent hydroxyl groups of a poor solvent results in a higher molecular weight unsaturated homolog which 35 is more suitable for the clear, concentrated fabric softener formulation. For example, the

preferred unsaturated 6,6-dimethyl-1-heptene-3,5-diol (CAS No. 109788-01-4) having no adjacent hydroxyl groups can be considered to be derived from the inoperable 2,2-dimethyl-3,4-hexanediol which has adjacent hydroxyl groups. In this case, it is more reliable to consider that the 6,6-dimethyl-1-heptene-3,5-diol is derived from either 2-methyl-3,5-heptanediol or 5,5-dimethyl-2,4-hexanediol which are both preferred principal solvents and do not have adjacent hydroxyl groups. Conversely, inserting CH_2 groups between the adjacent hydroxyl groups of a preferred principal solvent can result in an inoperable higher molecular weight unsaturated diol solvent. For example, the inoperable unsaturated 2,4-dimethyl-5-hexene-2,4-diol (CAS No. 87604-24-8) having no adjacent hydroxyl groups can be considered to be derived from the preferred 2,3-dimethyl-2,3-pentanediol which has adjacent hydroxyl groups. In this case, it is more reliably to derive the inoperable unsaturated 2,4-dimethyl-5-hexene-2,4-diol from either 2-methyl-2,4-hexanediol or 4-methyl-2,4-hexanediol which are both inoperable solvents and do not have adjacent hydroxyl groups. There are also cases where an inoperable unsaturated solvent having no adjacent hydroxyl groups can be considered to be derived from an inoperable solvent which has adjacent hydroxyl groups, such as the pair 4,5-dimethyl-6-hexene-1,3-diol and 3,4-dimethyl-1,2-pentanediol. Therefore, in order to deduce the formulatability of an unsaturated solvent having no adjacent hydroxyl groups, one should start from a low molecular weight saturated homolog also not having adjacent hydroxyl groups. I.e., in general, the relationship is more reliable when the distance/relationship of the two hydroxy groups is maintained. I.e., it is reliable to start from a saturated solvent with adjacent hydroxyl groups to deduce the formulatability of the higher molecular weight unsaturated homologs also having adjacent hydroxyl groups.

It has been discovered that the use of these specific principal alcohol solvents can produce clear, low viscosity, stable fabric softener compositions at surprisingly low principal solvent levels, i.e., less than about 40%, by weight of the composition. It has also been discovered that the use of the principal alcohol solvents can produce highly concentrated fabric softener compositions, that are stable and can be diluted, e.g. from about 2:1 to about 10:1, to produce compositions with lower levels of fabric softener that are still stable.

As previously discussed, the principal solvents are desirably kept to the lowest levels that are feasible in the present compositions for obtaining translucency or clarity. The presence of water exerts an important effect on the need for the principal solvents to achieve clarity of these compositions. The higher the water content, the higher the principal solvent level (relative to the softener level) is needed to attain product clarity.

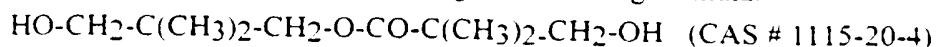
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Inversely, the less the water content, the less principal solvent (relative to the softener) is needed. Thus, at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is preferably from about 55:45 to about 85:15, more preferably from about 60:40 to about 80:20. At water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is preferably from about 45:55 to about 70:30, more preferably from about 55:45 to about 70:30. But at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is preferably from about 30:70 to about 55:45, more preferably from about 35:65 to about 45:55. At even higher water levels, the softener to principal solvent ratios should also be even higher.

Mixtures of the above principal solvents are particularly preferred, since one of the problems associated with large amounts of solvents is safety. Mixtures decrease the amount of any one material that is present. Odor and flammability can also be mimimized by use of mixtures, especially when one of the principal solvents is volatile and/or has an odor, which is more likely for low molecular weight materials. Suitable solvents that can be used at levels that would not be sufficient to produce a clear product are 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethyl-1,3-hexanediol. For the purposes of this invention, these solvents should only be used at levels that will not provide a stable, or clear product. Preferred mixtures are those where the majority of the solvent is one, or more, that have been identified hereinbefore as most preferred. The use of mixtures of solvents is also preferred, especially when one, or more, of the preferred principal solvents are solid at room temperature. In this case, the mixtures are fluid, or have lower melting points, thus improving processability of the softener compositions.

It is also discovered that it is possible to substitute for part of a principal solvent or a mixture of principal solvents of this invention with a secondary solvent, or a mixture of secondary solvents, which by themselves are not operable as a principal solvent of this invention, as long as an effective amount of the operable principal solvent(s) of this invention is still present in the liquid concentrated, clear fabric softener composition. An effective amount of the principal solvent(s) of this invention is at least greater than about 5%, preferably more than about 7%, more preferably more than about 10% of the composition, when at least about 15% of the softener active is also present. The substitute solvent(s) can be used at any level, but preferably about equal to, or less than, the amount of operable principal solvent, as defined hereinbefore, that is present in the fabric softener composition.

For example, even though 1,2-pentanediol, 1,3-octanediol, and hydroxy pivalyl hydroxy pivalate (hereinafter, HPHP) having the following formula:



are inoperable solvents according to this invention, mixtures of these solvents with the principal solvent, e.g., with the preferred 1,2-hexanediol principal solvent, wherein the 1,2-hexanediol principal solvent is present at effective levels, also provide liquid concentrated, clear fabric softener compositions.

Some of the secondary solvents that can be used are those listed as inoperable hereinbefore and hereinafter, as well as some parent, non-alkoxylated solvents disclosed in Tables VIIIA-VIIIE.

The principal solvent can be used to either make a composition translucent or clear, or can be used to reduce the temperature at which the composition is translucent or clear. Thus the invention also comprises the method of adding the principal solvent, at the previously indicated levels, to a composition that is not translucent, or clear, or which has a temperature where instability occurs that is too high, to make the composition translucent or clear, or, when the composition is clear, e.g., at ambient temperature, or down to a specific temperature, to reduce the temperature at which instability occurs, preferably by at least about 5°C, more preferably by at least about 10°C. The principal advantage of the principal solvent is that it provides the maximum advantage for a given weight of solvent. It is understood that "solvent", as used herein, refers to the effect of the principal solvent and not to its physical form at a given temperature, since some of the principal solvents are solids at ambient temperature.

Alkyl Lactates

Some alkyl lactate esters, e.g., ethyl lactate and isopropyl lactate have ClogP values within the effective range of from about 0.15 to about 0.64, and can form liquid concentrated, clear fabric softener compositions with the fabric softener actives of this invention, but need to be used at a slightly higher level than the more effective diol solvents like 1,2-hexanediol. They can also be used to substitute for part of other principal solvents of this invention to form liquid concentrated, clear fabric softener compositions. This is illustrated in Example I-C.

These principal solvents all provide the unobvious benefit described hereinbefore.

III. OPTIONAL INGREDIENTS

(A) Low molecular weight water soluble solvents can also be used at levels of of from 0% to about 12%, preferably from about 1% to about 10%, more preferably from

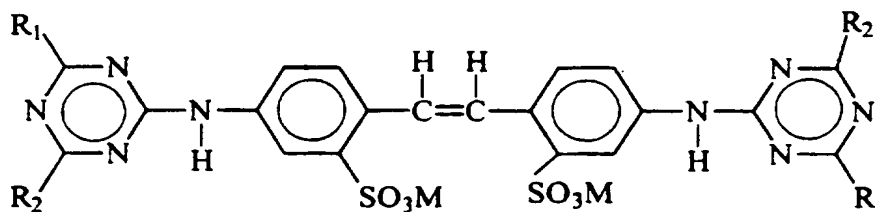
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about 2% to about 8%. The water soluble solvents cannot provide a clear product at the same low levels of the principal solvents described hereinbefore but can provide clear product when the principal solvent is not sufficient to provide completely clear product. The presence of these water soluble solvents is therefore highly desirable. Such solvents include: ethanol; isopropanol; 1,2-propanediol; 1,3-propanediol; propylene carbonate; etc. but do not include any of the principal solvents (B). These water soluble solvents have a greater affinity for water in the presence of hydrophobic materials like the softener active than the principal solvents.

(B) Brighteners

The compositions herein can also optionally contain from about 0.005% to 5% by weight of certain types of hydrophilic optical brighteners which also provide a dye transfer inhibition action. If used, the compositions herein will preferably comprise from about 0.001% to 1% by weight of such optical brighteners.

The hydrophilic optical brighteners useful in the present invention are those having the structural formula:



wherein R_1 is selected from anilino, N-2-bis-hydroxyethyl and NH-2-hydroxyethyl; R_2 is selected from N-2-bis-hydroxyethyl, N-2-hydroxyethyl-N-methylamino, morphilino, chloro and amino; and M is a salt-forming cation such as sodium or potassium.

When in the above formula, R_1 is anilino, R_2 is N-2-bis-hydroxyethyl and M is a cation such as sodium, the brightener is 4,4',-bis[(4-anilino-6-(N-2-bis-hydroxyethyl)-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid and disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal-UNPA-GX[®] by Ciba-Geigy Corporation. Tinopal-UNPA-GX is the preferred hydrophilic optical brightener useful in the rinse added compositions herein.

When in the above formula, R_1 is anilino, R_2 is N-2-hydroxyethyl-N-2-methylamino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-(N-2-hydroxyethyl-N-methylamino)-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal 5BM-GX[®] by Ciba-Geigy Corporation.

When in the above formula, R₁ is anilino, R₂ is morphilino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-morphilino-s-triazine-2-yl)amino]2,2'-stilbenedisulfonic acid, sodium salt. This particular brightener species is commercially marketed under the tradename Tinopal AMS-GX[®] by Ciba Geigy Corporation.

5 (C) Dispersibility Aids

(J) Optional Viscosity/Dispersibility Modifiers

Relatively concentrated compositions containing both saturated and unsaturated diester quaternary ammonium compounds can be prepared that are stable without the addition of concentration aids. However, the compositions of the present invention may
10 require organic and/or inorganic concentration aids to go to even higher concentrations and/or to meet higher stability standards depending on the other ingredients. These concentration aids which typically can be viscosity modifiers may be needed, or preferred, for ensuring stability under extreme conditions when particular softener active levels are used. The surfactant concentration aids are typically selected from the group
15 consisting of (1) single long chain alkyl cationic surfactants; (2) nonionic surfactants; (3) amine oxides; (4) fatty acids; and (5) mixtures thereof. These aids are described in P&G Copending Application Serial No. 08/461,207, filed June 5, 1995, Wahl et al., specifically on page 14, line 12 to page 20, line 12, which is herein incorporated by reference.

When said dispersibility aids are present, the total level is from about 2% to about
20 25%, preferably from about 3% to about 17%, more preferably from about 4% to about 15%, and even more preferably from 5% to about 13% by weight of the composition. These materials can either be added as part of the active softener raw material, (I), e.g., the mono-long chain alkyl cationic surfactant and/or the fatty acid which are reactants used to form the biodegradable fabric softener active as discussed hereinbefore, or added
25 as a separate component. The total level of dispersibility aid includes any amount that may be present as part of component (I).

(1) Mono-Alkyl Cationic Quaternary Ammonium Compound

When the mono-alkyl cationic quaternary ammonium compound is present, it is typically present at a level of from about 2% to about 25%, preferably from about 3% to
30 about 17%, more preferably from about 4% to about 15%, and even more preferably from 5% to about 13% by weight of the composition, the total mono-alkyl cationic quaternary ammonium compound being at least at an effective level.

Such mono-alkyl cationic quaternary ammonium compounds useful in the present invention are, preferably, quaternary ammonium salts of the general formula:



wherein

R^4 is C_8 - C_{22} alkyl or alkenyl group, preferably C_{10} - C_{18} alkyl or alkenyl group; more preferably C_{10} - C_{14} or C_{16} - C_{18} alkyl or alkenyl group;

each R^5 is a C_1 - C_6 alkyl or substituted alkyl group (e.g., hydroxy alkyl), preferably C_1 - C_3 alkyl group, e.g., methyl (most preferred), ethyl, propyl, and the like, a benzyl group, hydrogen, a polyethoxylated chain with from about 2 to about 20 oxyethylene units, preferably from about 2.5 to about 13 oxyethylene units, more preferably from about 3 to about 10 oxyethylene units, and mixtures thereof; and

X^- is as defined hereinbefore for (Formula (I)).

Especially preferred dispersibility aids are monolauryl trimethyl ammonium chloride and monotallow trimethyl ammonium chloride available from Witco under the trade name Varisoft® 471 and monooleyl trimethyl ammonium chloride available from Witco under the tradename Varisoft® 417.

The R^4 group can also be attached to the cationic nitrogen atom through a group containing one, or more, ester, amide, ether, amine, etc., linking groups which can be desirable for increased concentratability of component (I), etc. Such linking groups are preferably within from about one to about three carbon atoms of the nitrogen atom.

Mono-alkyl cationic quaternary ammonium compounds also include C_8 - C_{22} alkyl choline esters. The preferred dispersibility aids of this type have the formula:



wherein R^1 , R and X^- are as defined previously.

Highly preferred dispersibility aids include C_{12} - C_{14} coco choline ester and C_{16} - C_{18} tallow choline ester.

Suitable biodegradable single-long-chain alkyl dispersibility aids containing an ester linkage in the long chains are described in U.S. Pat. No. 4,840,738, Hardy and Walley, issued June 20, 1989, said patent being incorporated herein by reference.

When the dispersibility aid comprises alkyl choline esters, preferably the compositions also contain a small amount, preferably from about 2% to about 5% by weight of the composition, of organic acid. Organic acids are described in European Patent Application No. 404,471, Machin et al., published on Dec. 27, 1990, supra, which is herein incorporated by reference. Preferably the organic acid is selected from the group consisting of glycolic acid, acetic acid, citric acid, and mixtures thereof.

Ethoxylated quaternary ammonium compounds which can serve as the dispersibility aid include ethylbis(polyethoxy ethanol)alkylammonium ethyl-sulfate with 17 moles of ethylene oxide, available under the trade name Variquat® 66 from Sherex

Chemical Company; polyethylene glycol (15) oleammonium chloride, available under the trade name Ethoquad® 0/25 from Akzo; and polyethylene glycol (15) cocomonium chloride, available under the trade name Ethoquad® C/25 from Akzo.

Although the main function of the dispersibility aid is to increase the dispersibility of the ester softener, preferably the dispersibility aids of the present invention also have some softening properties to boost softening performance of the composition. Therefore, preferably the compositions of the present invention are essentially free of non-nitrogenous ethoxylated nonionic dispersibility aids which will decrease the overall softening performance of the compositions.

Also, quaternary compounds having only a single long alkyl chain, can protect the cationic softener from interacting with anionic surfactants and/or detergent builders that are carried over into the rinse from the wash solution.

(2) Amine Oxides

Suitable amine oxides include those with one alkyl or hydroxyalkyl moiety of about 8 to about 22 carbon atoms, preferably from about 10 to about 18 carbon atoms, more preferably from about 8 to about 14 carbon atoms, and two alkyl moieties selected from the group consisting of alkyl groups and hydroxyalkyl groups with about 1 to about 3 carbon atoms.

Examples include dimethyloctylamine oxide, diethyldecylamine oxide, bis-(2-hydroxyethyl)dodecyl-amine oxide, dimethyldodecylamine oxide, dipropyl-tetradecylamine oxide, methylethylhexadecylamine oxide, dimethyl-2-hydroxyoctadecylamine oxide, and coconut fatty alkyl dimethylamine oxide.

(D) Stabilizers

Stabilizers can be present in the compositions of the present invention. The term "stabilizer," as used herein, includes antioxidants and reductive agents. These agents are present at a level of from 0% to about 2%, preferably from about 0.01% to about 0.2%, more preferably from about 0.035% to about 0.1% for antioxidants, and more preferably from about 0.01% to about 0.2% for reductive agents. These assure good odor stability under long term storage conditions. Antioxidants and reductive agent stabilizers are especially critical for unscented or low scent products (no or low perfume).

Examples of antioxidants that can be added to the compositions of this invention include a mixture of ascorbic acid, ascorbic palmitate, propyl gallate, available from Eastman Chemical Products, Inc., under the trade names Tenox® PG and Tenox® S-1; a mixture of BHT (butylated hydroxytoluene), BHA (butylated hydroxyanisole), propyl gallate, and citric acid, available from Eastman Chemical Products, Inc., under the trade

name Tenox®-6; butylated hydroxytoluene, available from UOP Process Division under the trade name Sustane® BHT; tertiary butylhydroquinone, Eastman Chemical Products, Inc., as Tenox® TBHQ; natural tocopherols, Eastman Chemical Products, Inc., as Tenox® GT-1/GT-2; and butylated hydroxyanisole, Eastman Chemical Products, Inc., as BHA; long chain esters (C_8 - C_{22}) of gallic acid, e.g., dodecyl gallate; Irganox® 1010; Irganox® 1035; Irganox® B 1171; Irganox® 1425; Irganox® 3114; Irganox® 3125; and mixtures thereof; preferably Irganox® 3125, Irganox® 1425, Irganox® 3114, and mixtures thereof; more preferably Irganox® 3125 alone or mixed with citric acid and/or other chelators such as isopropyl citrate, Dequest® 2010, available from Monsanto with a chemical name of 1-hydroxyethylidene-1, 1-diphosphonic acid (etidronic acid), and Tiron®, available from Kodak with a chemical name of 4,5-dihydroxy-m-benzene-sulfonic acid/sodium salt, and DTPA®, available from Aldrich with a chemical name of diethylenetriaminepentaacetic acid.

The chemical names and CAS numbers for some of the above stabilizers which can be used in the compositions of the present invention are listed in Table I below.

(E) Soil Release Agent

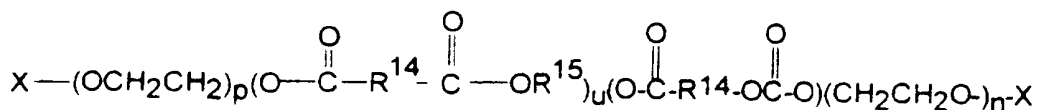
In the present invention, an optional soil release agent can be added. The addition of the soil release agent can occur in combination with the premix, in combination with the acid/water seat, before or after electrolyte addition, or after the final composition is made. The softening composition prepared by the process of the present invention herein can contain from 0% to about 10%, preferably from 0.2% to about 5%, of a soil release agent. Preferably, such a soil release agent is a polymer. Polymeric soil release agents useful in the present invention include copolymeric blocks of terephthalate and polyethylene oxide or polypropylene oxide, and the like.

A preferred soil release agent is a copolymer having blocks of terephthalate and polyethylene oxide. More specifically, these polymers are comprised of repeating units of ethylene terephthalate and polyethylene oxide terephthalate at a molar ratio of ethylene terephthalate units to polyethylene oxide terephthalate units of from 25:75 to about 35:65, said polyethylene oxide terephthalate containing polyethylene oxide blocks having molecular weights of from about 300 to about 2000. The molecular weight of this polymeric soil release agent is in the range of from about 5,000 to about 55,000.

Another preferred polymeric soil release agent is a crystallizable polyester with repeat units of ethylene terephthalate units containing from about 10% to about 15% by weight of ethylene terephthalate units together with from about 10% to about 50% by weight of polyoxyethylene terephthalate units, derived from a polyoxyethylene glycol of

average molecular weight of from about 300 to about 6,000, and the molar ratio of ethylene terephthalate units to polyoxyethylene terephthalate units in the crystallizable polymeric compound is between 2:1 and 6:1. Examples of this polymer include the commercially available materials Zelcon 4780® (from Dupont) and Milease T® (from ICI).

Highly preferred soil release agents are polymers of the generic formula:



in which each X can be a suitable capping group, with each X typically being selected from the group consisting of H, and alkyl or acyl groups containing from about 1 to about 4 carbon atoms. p is selected for water solubility and generally is from about 6 to about 113, preferably from about 20 to about 50. u is critical to formulation in a liquid composition having a relatively high ionic strength. There should be very little material in which u is greater than 10. Furthermore, there should be at least 20%, preferably at least 40%, of material in which u ranges from about 3 to about 5.

The R¹⁴ moieties are essentially 1,4-phenylene moieties. As used herein, the term "the R¹⁴ moieties are essentially 1,4-phenylene moieties" refers to compounds where the R¹⁴ moieties consist entirely of 1,4-phenylene moieties, or are partially substituted with other arylene or alkarylene moieties, alkylene moieties, alkenylene moieties, or mixtures thereof. Arylene and alkarylene moieties which can be partially substituted for 1,4-phenylene include 1,3-phenylene, 1,2-phenylene, 1,8-naphthylene, 1,4-naphthylene, 2,2-biphenylene, 4,4-biphenylene, and mixtures thereof. Alkylene and alkenylene moieties which can be partially substituted include 1,2-propylene, 1,4-butylene, 1,5-pentylene, 1,6-hexamethylene, 1,7-heptamethylene, 1,8-octamethylene, 1,4-cyclohexylene, and mixtures thereof.

For the R¹⁴ moieties, the degree of partial substitution with moieties other than 1,4-phenylene should be such that the soil release properties of the compound are not adversely affected to any great extent. Generally the degree of partial substitution which can be tolerated will depend upon the backbone length of the compound, i.e., longer backbones can have greater partial substitution for 1,4-phenylene moieties. Usually, compounds where the R¹⁴ comprise from about 50% to about 100% 1,4-phenylene moieties (from 0% to about 50% moieties other than 1,4-phenylene) have adequate soil release activity. For example, polyesters made according to the present invention with a

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40:60 mole ratio of isophthalic (1,3-phenylene) to terephthalic (1,4-phenylene) acid have adequate soil release activity. However, because most polyesters used in fiber making comprise ethylene terephthalate units, it is usually desirable to minimize the degree of partial substitution with moieties other than 1,4-phenylene for best soil release activity. Preferably, the R^{14} moieties consist entirely of (i.e., comprise 100%) 1,4-phenylene moieties, i.e., each R^{14} moiety is 1,4-phenylene.

For the R^{15} moieties, suitable ethylene or substituted ethylene moieties include ethylene, 1,2-propylene, 1,2-butylene, 1,2-hexylene, 3-methoxy-1,2-propylene, and mixtures thereof. Preferably, the R^{15} moieties are essentially ethylene moieties, 1,2-propylene moieties, or mixtures thereof. Inclusion of a greater percentage of ethylene moieties tends to improve the soil release activity of compounds. Surprisingly, inclusion of a greater percentage of 1,2-propylene moieties tends to improve the water solubility of compounds.

Therefore, the use of 1,2-propylene moieties or a similar branched equivalent is desirable for incorporation of any substantial part of the soil release component in the liquid fabric softener compositions. Preferably, from about 75% to about 100%, are 1,2-propylene moieties.

The value for each p is at least about 6, and preferably is at least about 10. The value for each n usually ranges from about 12 to about 113. Typically the value for each p is in the range of from about 12 to about 43.

A more complete disclosure of soil release agents is contained in U.S. Pat. Nos.: 4,661,267, Decker, Konig, Straathof, and Gosselink, issued Apr. 28, 1987; 4,711,730, Gosselink and Diehl, issued Dec. 8, 1987; 4,749,596, Evans, Huntington, Stewart, Wolf, and Zimmerer, issued June 7, 1988; 4,818,569, Trinh, Gosselink, and Rattinger, issued April 4, 1989; 4,877,896, Maldonado, Trinh, and Gosselink, issued Oct. 31, 1989; 4,956,447, Gosselink et al., issued Sept. 11, 1990; and 4,976,879, Maldonado, Trinh, and Gosselink, issued Dec. 11, 1990, all of said patents being incorporated herein by reference.

These soil release agents can also act as scum dispersants.

(F) Scum Dispersant

In the present invention, the premix can be combined with an optional scum dispersant, other than the soil release agent, and heated to a temperature at or above the melting point(s) of the components.

The preferred scum dispersants herein are formed by highly ethoxylating hydrophobic materials. The hydrophobic material can be a fatty alcohol, fatty acid, fatty

amine, fatty acid amide, amine oxide, quaternary ammonium compound, or the hydrophobic moieties used to form soil release polymers. The preferred scum dispersants are highly ethoxylated, e.g., more than about 17, preferably more than about 25, more preferably more than about 40, moles of ethylene oxide per molecule on the average, with the polyethylene oxide portion being from about 76% to about 97%, preferably from about 81% to about 94%, of the total molecular weight.

The level of scum dispersant is sufficient to keep the scum at an acceptable, preferably unnoticeable to the consumer, level under the conditions of use, but not enough to adversely affect softening. For some purposes it is desirable that the scum is nonexistent. Depending on the amount of anionic or nonionic detergent, etc., used in the wash cycle of a typical laundering process, the efficiency of the rinsing steps prior to the introduction of the compositions herein, and the water hardness, the amount of anionic or nonionic detergent surfactant and detergency builder (especially phosphates and zeolites) entrapped in the fabric (laundry) will vary. Normally, the minimum amount of scum dispersant should be used to avoid adversely affecting softening properties. Typically scum dispersion requires at least about 2%, preferably at least about 4% (at least 6% and preferably at least 10% for maximum scum avoidance) based upon the level of softener active. However, at levels of about 10% (relative to the softener material) or more, one risks loss of softening efficacy of the product especially when the fabrics contain high proportions of nonionic surfactant which has been absorbed during the washing operation.

Preferred scum dispersants are: Brij 700®; Varonic U-250®; Genapol T-500®, Genapol T-800®, Plurafac A-79®, and Neodol 25-50®.

(G) Bactericides

Examples of bactericides used in the compositions of this invention include glutaraldehyde, formaldehyde, 2-bromo-2-nitro-propane-1,3-diol sold by Inolex Chemicals, located in Philadelphia, Pennsylvania, under the trade name Bronopol®, and a mixture of 5-chloro-2-methyl-4-isothiazoline-3-one and 2-methyl-4-isothiazoline-3-one sold by Rohm and Haas Company under the trade name Kathon about 1 to about 1,000 ppm by weight of the agent.

(H) Perfume

The present invention can contain any softener compatible perfume. Suitable perfumes are disclosed in U.S. Pat. 5,500,138, Bacon et al., issued March 19, 1996, said patent being incorporated herein by reference.

As used herein, perfume includes fragrant substance or mixture of substances including natural (i.e., obtained by extraction of flowers, herbs, leaves,

roots, barks, wood, blossoms or plants), artificial (i.e., a mixture of different nature oils or oil constituents) and synthetic (i.e., synthetically produced) odoriferous substances. Such materials are often accompanied by auxiliary materials, such as fixatives, extenders, stabilizers and solvents. These auxiliaries are also included within the meaning of "perfume", as used herein. Typically, perfumes are complex mixtures of a plurality of organic compounds.

Examples of perfume ingredients useful in the perfumes of the present invention compositions include, but are not limited to, hexyl cinnamic aldehyde; amyl cinnamic aldehyde; amyl salicylate; hexyl salicylate; terpineol; 3,7-dimethyl-*cis*-2,6-octadien-1-ol; 2,6-dimethyl-2-octanol; 2,6-dimethyl-7-octen-2-ol; 3,7-dimethyl-3-octanol; 3,7-dimethyl-*trans*-2,6-octadien-1-ol; 3,7-dimethyl-6-octen-1-ol; 3,7-dimethyl-1-octanol; 2-methyl-3-(para-tert-butylphenyl)-propionaldehyde; 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde; tricyclodecenyl propionate; tricyclodecenyl acetate; anisaldehyde; 2-methyl-2-(para-isopropylphenyl)-propionaldehyde; ethyl-3-methyl-3-phenyl glycidate; 4-(para-hydroxyphenyl)-butan-2-one; 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one; para-methoxyacetophenone; para-methoxy-alpha-phenylpropene; methyl-2-n-hexyl-3-oxo-cyclopentane carboxylate; undecalactone gamma.

Additional examples of fragrance materials include, but are not limited to, orange oil; lemon oil; grapefruit oil; bergamot oil; clove oil; dodecalactone gamma; methyl-2-(2-pentyl-3-oxo-cyclopentyl) acetate; beta-naphthol methylether; methyl-beta-naphthylketone; coumarin; decylaldehyde; benzaldehyde; 4-tert-butylcyclohexyl acetate; alpha,alpha-dimethylphenethyl acetate; methylphenylcarbonyl acetate; Schiff's base of 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate; cyclic ethyleneglycol diester of tridecandioic acid; 3,7-dimethyl-2,6-octadiene-1-nitrile; ionone gamma methyl; ionone alpha; ionone beta; petitgrain; methyl cedrylone; 7-acetyl-1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethyl-naphthalene; ionone methyl; methyl-1,6,10-trimethyl-2,5,9-cyclododecatrien-1-yl ketone; 7-acetyl-1,1,3,4,4,6-hexamethyl tetralin; 4-acetyl-6-tert-butyl-1,1-dimethyl indane; benzophenone; 6-acetyl-1,1,2,3,3,5-hexamethyl indane; 5-acetyl-3-isopropyl-1,1,2,6-tetramethyl indane; 1-dodecanal; 7-hydroxy-3,7-dimethyl octanal; 10-undecen-1-al; iso-hexenyl cyclohexyl carboxaldehyde; formyl tricyclodecan; cyclopentadecanolide; 16-hydroxy-9-hexadecenoic acid lactone; 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-gamma-2-benzopyrane; ambroxane; dodecahydro-3a,6,6,9a-

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5 tetramethylnaphtho-[2,1b]furan; cedrol; 5-(2,2,3-trimethylcyclopent-3-enyl)-3-methylpentan-2-ol; 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol; caryophyllene alcohol; cedryl acetate; para-tert-butylcyclohexyl acetate; patchouli; olibanum resinoid; labdanum; vetivert; copaiba balsam; fir balsam; and
 5 condensation products of: hydroxycitronellal and methyl anthranilate; hydroxycitronellal and indol; phenyl acetaldehyde and indol; 4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate.

More examples of perfume components are geraniol; geranyl acetate; linalool; linalyl acetate; tetrahydrolinalool; citronellol; citronellyl acetate;
 10 dihydromyrcenol; dihydromyrcenyl acetate; tetrahydromyrcenol; terpinyl acetate; nopol; nopyl acetate; 2-phenylethanol; 2-phenylethyl acetate; benzyl alcohol; benzyl acetate; benzyl salicylate; benzyl benzoate; styrallyl acetate; dimethylbenzylcarbinol; trichloromethylphenylcarbinyl methylphenylcarbinyl acetate; isononyl acetate; vetiveryl acetate; vetiverol; 2-methyl-3-(p-tert-butylphenyl)-propanal;
 15 2-methyl-3-(p-isopropylphenyl)-propanal; 3-(p-tert-butylphenyl)-propanal; 4-(4-methyl-3-pentenyl)-3-cyclohexenecarbaldehyde; 4-acetoxy-3-pentyltetrahydropyran; methyl dihydrojasmonate; 2-n-heptylcyclopentanone; 3-methyl-2-pentyl-cyclopentanone; n-decanal; n-dodecanal; 9-decenol-1; phenoxyethyl isobutyrate; phenylacetaldehyde dimethylacetal;
 20 phenylacetaldehyde diethylacetal; geranonitrile; citronellonitrile; cedryl acetal; 3-isocamphylcyclohexanol; cedryl methylether; isolongifolanone; aubepine nitrile; aubepine; heliotropine; eugenol; vanillin; diphenyl oxide; hydroxycitronellal ionones; methyl ionones; isomethyl ionones; irones; cis-3-hexenol and esters thereof; indane musk fragrances; tetralin musk fragrances; isochroman musk
 25 fragrances; macrocyclic ketones; macrolactone musk fragrances; ethylene brassylate.

The perfumes useful in the present invention compositions are substantially free of halogenated materials and nitromusks.

Suitable solvents, diluents or carriers for perfumes ingredients mentioned
 30 above are for examples, ethanol, isopropanol, diethylene glycol, monoethyl ether, dipropylene glycol, diethyl phthalate, triethyl citrate, etc. The amount of such solvents, diluents or carriers incorporated in the perfumes is preferably kept to the minimum needed to provide a homogeneous perfume solution.

Perfume can be present at a level of from 0% to about 10%, preferably from
 35 about 0.1% to about 5%, and more preferably from about 0.2% to about 3%, by

weight of the finished composition. Fabric softener compositions of the present invention provide improved fabric perfume deposition.

(I) Chelating Agents

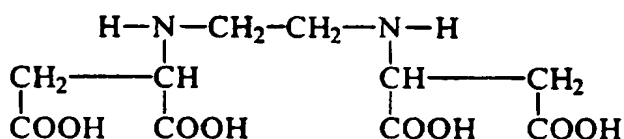
The compositions and processes herein can optionally employ one or more copper and/or nickel chelating agents ("chelators"). Such water-soluble chelating agents can be selected from the group consisting of amino carboxylates, amino phosphonates, polyfunctionally-substituted aromatic chelating agents and mixtures thereof, all as hereinafter defined. The whiteness and/or brightness of fabrics are substantially improved or restored by such chelating agents and the stability of the materials in the compositions are improved.

Amino carboxylates useful as chelating agents herein include ethylenediaminetetraacetates (EDTA), N-hydroxyethylethylenediaminetriacetates, nitrilotriacetates (NTA), ethylenediamine tetrapropionates, ethylenediamine-N,N'-diglutamates, 2-hydroxypropylenediamine-N,N'-disuccinates, triethylenetetraaminehexacetates, diethylenetriaminepentaacetates (DETPA), and ethanoldiglycines, including their water-soluble salts such as the alkali metal, ammonium, and substituted ammonium salts thereof and mixtures thereof.

Amino phosphonates are also suitable for use as chelating agents in the compositions of the invention when at least low levels of total phosphorus are permitted in detergent compositions, and include ethylenediaminetetrakis (methylenephosphonates), diethylenetriamine-N,N,N',N",N"-pentakis(methane phosphonate) (DETMP) and 1-hydroxyethane-1,1-diphosphonate (HEDP). Preferably, these amino phosphonates do not contain alkyl or alkenyl groups with more than about 6 carbon atoms.

The chelating agents are typically used in the present rinse process at levels from about 2 ppm to about 25 ppm, for periods from 1 minute up to several hours' soaking.

The preferred EDDS chelator used herein (also known as ethylenediamine-N,N'-disuccinate) is the material described in U.S. Patent 4,704,233, cited hereinabove, and has the formula (shown in free acid form):



As disclosed in the patent, EDDS can be prepared using maleic anhydride and ethylenediamine. The preferred biodegradable [S,S] isomer of EDDS can be prepared by reacting L-aspartic acid with 1,2-dibromoethane. The EDDS has advantages over other chelators in that it is effective for chelating both copper and nickel cations, is available in

a biodegradable form, and does not contain phosphorus. The EDDS employed herein as a chelator is typically in its salt form, i.e., wherein one or more of the four acidic hydrogens are replaced by a water-soluble cation M, such as sodium, potassium, ammonium, triethanolammonium, and the like. As noted before, the EDDS chelator is also typically
5 used in the present rinse process at levels from about 2 ppm to about 25 ppm for periods from 1 minute up to several hours' soaking. At certain pH's the EDDS is preferably used in combination with zinc cations.

As can be seen from the foregoing, a wide variety of chelators can be used herein. Indeed, simple polycarboxylates such as citrate, oxydisuccinate, and the like, can also be
10 used, although such chelators are not as effective as the amino carboxylates and phosphonates, on a weight basis. Accordingly, usage levels may be adjusted to take into account differing degrees of chelating effectiveness. The chelators herein will preferably have a stability constant (of the fully ionized chelator) for copper ions of at least about 5, preferably at least about 7. Typically, the chelators will comprise from about 0.5% to
15 about 10%, more preferably from about 0.75% to about 5%, by weight of the compositions herein. Preferred chelators include DETMP, DETPA, NTA, EDDS and mixtures thereof.

(J) Other Optional Ingredients

The present invention can include optional components conventionally used in
20 textile treatment compositions, for example: colorants; preservatives; surfactants; anti-shrinkage agents; fabric crisping agents; spotting agents; germicides; fungicides; anti-oxidants such as butylated hydroxy toluene, anti-corrosion agents, and the like.

Particularly preferred ingredients include water soluble calcium and/or magnesium compounds, which provide additional stability. The chloride salts are preferred, but
25 acetate, nitrate, etc. salts can be used. The level of said calcium and/or magnesium salts is from 0% to about 2%, preferably from about 0.05% to about 0.5%, more preferably from about 0.1% to about 0.25%.

The present invention can also include other compatible ingredients, including those as disclosed in copending applications Serial Nos.: 08/372,068, filed January 12,
30 1995, Rusche, et al.; 08/372,490, filed January 12, 1995, Shaw, et al.; and 08/277,558, filed July 19, 1994, Hartman, et al., incorporated herein by reference.

Solid Compositions

1. Solid particulate compositions

As discussed hereinbefore, the invention also comprises solid particulate
35 composition comprising:

- (A) from about 50% to about 95%, preferably from about 60% to about 90%, of said biodegradable fabric softening active;
- (B) optionally, from 0% to about 30%, preferably from about 3% to about 15%, of dispersibility modifier; and
- 5 (D) from 0% to about 10% of a pH modifier.

Optional pH Modifier

Since the biodegradable ester fabric softener actives are somewhat labile to hydrolysis, it is preferable to include optional pH modifiers in the solid particulate composition to which water is to be added, to form stable dilute or concentrated liquid softener compositions. Said stable liquid compositions should have a pH (neat) of from about 2 to about 5, preferably from about 2 to about 4.5, more preferably from about 2 to about 4.

The pH can be adjusted by incorporating a solid, water soluble Bronsted acid. Examples of suitable Bronsted acids include inorganic mineral acids, such as boric acid, sodium bisulfate, potassium bisulfate, sodium phosphate monobasic, potassium phosphate monobasic, and mixtures thereof; organic acids, such as citric acid, fumaric acid, maleic acid, malic acid, tannic acid, gluconic acid, glutamic acid, tartaric acid, glycolic acid, chloroacetic acid, phenoxyacetic acid, 1,2,3,4-butane tetracarboxylic acid, benzene sulfonic acid, benzene phosphonic acid, ortho-toluene sulfonic acid, para-toluene sulfonic acid, phenol sulfonic acid, naphthalene sulfonic acid, oxalic acid, 1,2,4,5-pyromellitic acid, 1,2,4-trimellitic acid, adipic acid, benzoic acid, phenylacetic acid, salicylic acid, succinic acid, and mixtures thereof; and mixtures of mineral inorganic acids and organic acids. Preferred pH modifiers are citric acid, gluconic acid, tartaric acid, 1,2,3,4-butane tetracarboxylic acid, malic acid, and mixtures thereof.

Optionally, materials that can form solid clathrates such as cyclodextrins and/or zeolites, etc., can be used as adjuvants in the solid particulate composition as host carriers of concentrated liquid acids and/or anhydrides, such as acetic acid, HCl, sulfuric acid, phosphoric acid, nitric acid, carbonic acid, etc. An example of such solid clathrates is carbon dioxide adsorbed in zeolite A, as disclosed in U.S. Patent 3,888,998, Whyte and Samps, issued June 10, 1975 and U.S. Patent 4,007,134, Liepe and Japikse, issued Feb. 8, 1977, both of said patents being incorporated herein by reference. Examples of inclusion complexes of phosphoric acid, sulfuric acid, and nitric acid, and process for their preparation are disclosed in U.S. Pat. No. 4,365,061, issued Dec. 21, 1982 to Szejtli et al., said patent being incorporated herein by reference.

When used, the pH modifier is typically used at a level of from about 0.01% to about 10%, preferably from about 0.1% to about 5%, by weight of the composition.

Preparation of Solid Particulate Granular Fabric Softener

5 The granules can be formed by preparing a melt, solidifying it by cooling, and then grinding and sieving to the desired size. In a three-component mixture, e.g., nonionic surfactant, single-long-chain cationic, and DEQA, it is more preferred, when forming the granules, to pre-mix the nonionic surfactant and the more soluble single-long-chain alkyl cationic compound before mixing in a melt of the diester quaternary ammonium cationic compound.

10 It is highly preferred that the primary particles of the granules have a diameter of from about 50 to about 1,000, preferably from about 50 to about 400, more preferably from about 50 to about 200, microns. The granules can comprise smaller and larger particles, but preferably from about 85% to about 95%, more preferably from about 95% to about 100%, are within the indicated ranges. Smaller and larger particles do not
15 provide optimum emulsions/dispersions when added to water. Other methods of preparing the primary particles can be used including spray cooling of the melt. The primary particles can be agglomerated to form a dust-free, non-tacky, free-flowing powder. The agglomeration can take place in a conventional agglomeration unit (i.e., Zig-Zag Blender, Lodige) by means of a water-soluble binder. Examples of
20 water-soluble binders useful in the above agglomeration process include glycerol, polyethylene glycols, polymers such as PVA, polyacrylates, and natural polymers such as sugars.

The flowability of the granules can be improved by treating the surface of the granules with flow improvers such as clay, silica or zeolite particles, water-soluble
25 inorganic salts, starch, etc.

Method of Use

Water can be added to the particulate, solid, granular compositions to form dilute or concentrated liquid softener compositions for later addition to the rinse cycle of the laundry process with a concentration of said biodegradable cationic softening compound
30 of from about 0.5% to about 50%, preferably from about 1% to about 35%, more preferably from about 4% to about 32%.. The particulate, rinse-added solid composition (1) can also be used directly in the rinse bath to provide adequate usage concentration (e.g., from about 10 to about 1,000 ppm, preferably from about 50 to about 500 ppm, of total softener active ingredient). The liquid compositions can be added to the rinse to
35 provide the same usage concentrations.

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The water temperature for preparation should be from about 20°C to about 90°C, preferably from about 25°C to about 80°C. Single-long-chain alkyl cationic surfactants as the viscosity/dispersibility modifier at a level of from 0% to about 15%, preferably from about 3% to about 15%, more preferably from about 5% to about 15%, by weight of the composition, are preferred for the solid composition. Nonionic surfactants at a level of from about 5% to about 20%, preferably from about 8% to about 15%, as well as mixtures of these agents can also serve effectively as the viscosity/dispersibility modifier.

The emulsified/dispersed particles, formed when the said granules are added to water to form aqueous concentrates, typically have an average particle size of less than about 10 microns, preferably less than about 2 microns, and more preferably from about 0.2 to about 2 microns, in order that effective deposition onto fabrics is achieved. The term "average particle size," in the context of this specification, means a number average particle size, i.e., more than 50% of the particles have a diameter less than the specified size.

Particle size for the emulsified/dispersed particles is determined using, e.g., a Malvern particle size analyzer.

Depending upon the particular selection of nonionic and cationic surfactant, it may be desirable in certain cases, when using the solids to prepare the liquid, to employ an efficient means for dispersing and emulsifying the particles (e.g., blender).

Solid particulate compositions used to make liquid compositions can, optionally, contain electrolytes, perfume, antifoam agents, flow aids (e.g., silica), dye, preservatives, and/or other optional ingredients described hereinbefore.

The benefits of adding water to the particulate solid composition to form aqueous compositions to be added later to the rinse bath include the ability to transport less weight thereby making shipping more economical, and the ability to form liquid compositions similar to those that are normally sold to consumers, e.g., those that are described herein, with lower energy input (i.e., less shear and/or lower temperature). Furthermore, the particulate granular solid fabric softener compositions, when sold directly to the consumers, have less packaging requirements and smaller, more disposable containers. The consumers will then add the compositions to available, more permanent, containers, and add water to pre-dilute the compositions, which are then ready for use in the rinse bath, just like the liquid compositions herein. The liquid form is easier to handle, since it simplifies measuring and dispensing.

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2. Dryer Activated compositions

The present invention also relates to improved solid dryer-activated fabric softener compositions which are either (A) incorporated into articles of manufacture, e.g., on a substrate, or, are (B) in the form of particles similar to those disclosed above, (including, where appropriate, agglomerates, pellets, and tablets of said particles). Such compositions typically contain from about 10% to about 95% of fabric softening agent.

A. Substrate Articles

In preferred embodiments, the present invention encompasses articles of manufacture. Representative articles are those that are adapted for use to provide unique perfume benefits and to soften fabrics in an automatic laundry dryer, of the types disclosed in U.S. Pat. Nos.: 3,989,631 Marsan, issued Nov. 2, 1976; 4,055,248, Marsan, issued Oct. 25, 1977; 4,073,996, Bedenk et al., issued Feb. 14, 1978; 4,022,938, Zaki et al., issued May 10, 1977; 4,764,289, Trinh, issued Aug. 16, 1988; 4,808,086, Evans et al., issued Feb. 28, 1989; 4,103,047, Zaki et al., issued July 25, 1978; 3,736,668, Dillarstone, issued June 5, 1973; 3,701,202, Compa et al., issued Oct. 31, 1972; 3,634,947, Furgal, issued Jan. 18, 1972; 3,633,538, Hoeflin, issued Jan. 11, 1972; and 3,435,537, Rumsey, issued Apr. 1, 1969; and 4,000,340, Murphy et al., issued Dec. 28, 1976, all of said patents being incorporated herein by reference.

Typical articles of manufacture of this type include articles comprising:

- I. a fabric conditioning composition comprising from about 30% to about 95% of normally solid, dryer softenable fabric softening agent comprising said biodegradable fabric softening active; and
- II. a dispensing means which provides for release of an effective amount of said composition including an effective amount of ii, sufficient to provide odor control, to fabrics in an automatic laundry dryer at automatic laundry dryer operating temperatures, e.g., from about 35°C to 115°C.

When the dispensing means is a flexible substrate, e.g., in sheet configuration, the fabric conditioning composition is releasably affixed on the substrate to provide a weight ratio of conditioning composition to dry substrate ranging from about 10:1 to about 0.5:1, preferably from about 5:1 to about 1:1.

The solid fabric softener compositions herein can include cationic and nonionic fabric softener actives used in combination with each other.

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PREPARATION OF PRINCIPAL SOLVENTS PREPARATION OF DIOL PRINCIPAL SOLVENTS

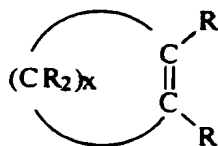
Many synthesis methods can be used to prepare the diol principal solvents of this invention. The appropriate method is selected for each specific structural requirement of each principal solvent. Furthermore, most principal solvents can also be prepared by more than one method. Therefore, the methods cited herein for each specific principal solvent are for illustrative purposes only and should not be considered as limiting.

METHOD A

Preparation of 1,5-, 1,6-, and 1,7-Diols

Method 1

This synthesis method is a general preparation of α,ω -type diols derived from substituted cyclic alkenes. Examples of cyclic alkenes are the alkylated isomers of cyclopentene, cyclohexene, and cycloheptene. The general formula of useful alkylated cyclic alkenes is

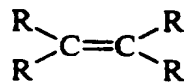


wherein each R is H, or C₁-C₄-alkyl, and where x is 3, 4, or 5.

Cyclic alkenes may be converted to the terminal diols by a three step reaction sequence.

Step 1 is the reaction of the cyclic alkene with ozone (O₃) in a solvent such as anhydrous ethyl acetate to form the intermediate ozonide. In Step 2 the ozonide is reduced by, e.g., palladium catalyst /H₂ to the dialdehyde which is then converted in Step 3 to the target diol by borohydride reduction.

The 1,2- diols are generally prepared by direct hydroxylation of the appropriate substituted olefins. Example:



wherein each R is H, alkyl, etc.

In a typical reaction the alkene is reacted with hydrogen peroxide (30%) and a catalytic amount of osmium tetroxide in t-butyl alcohol or other suitable solvent. The reaction is cooled to about 0°C and allowed to run overnight. Unreacted compounds and solvent are removed by distillation and the desired 1,2- diol isolated by distillation or crystallization.

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- Method 2** An alternate method is the conversion of the olefin to the epoxide by the reaction of m-chloroperbenzoic acid, or peracetic acid, in a solvent such as methylene chloride at temperatures below about 25°C. The epoxide generated by this chemistry is then opened to the diol by, e.g., hydrolysis with dilute sulfuric acid.
- 5 Step 3 to the target diol by borohydride reduction.

Method 3

- An alternate method for the preparation of these compounds is by direct hydroxylation of the cyclic alkene with hydrogen peroxide and a catalytic amount of osmium tetroxide. The reaction yields the cyclic diol which is then converted to the open chain dialdehyde by periodate or lead tetraacetate. The dialdehyde is then reduced with borohydride as in Method 1, to give the desired 1,5- or 1,6- diols, etc.
- 10

METHOD B**Preparation of 1,2 Diols****Method 1**

15 **METHOD C**

Preparation of 1,3-Diols**Acylation of Enamines**

- This preparation is for the general type of 1,3-diols and accommodates a variety of structural features. Enamines are formed from both ketones and aldehydes which react with acid chlorides to form the acylated product. The acylated amine derivative is hydrolyzed back to its acylated carbonyl compound which is the 1,3-dicarbonyl precursor to the desired 1,3-diol. The diol is generated by borohydride reduction of the 1,3-dicarbonyl compound.
- 20

- Thus acetaldehyde (aldehydes) may be reacted with a secondary amine, preferably cyclic amines such as pyrrolidine or morpholine, by heating at reflux in a solvent such as toluene and with a catalytic amount of p-toluene sulfonic acid. As the amine reacts (condenses) with the carbonyl compound, water is produced and is removed, e.g., by reflux through a water trap. After the theoretical amount of water has been removed, the reaction mixture is stripped, e.g., under vacuum, to remove the solvent, if desired (the acylation can be done in the same solvent systems in most cases).
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- 30

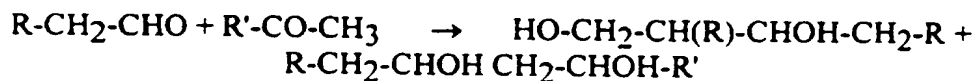
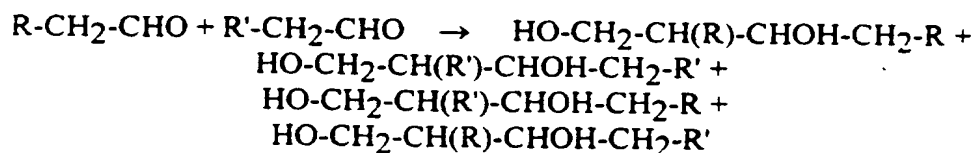
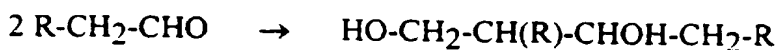
- The anhydrous crude enamine containing some excess amine is reacted with the appropriate acid chloride at about 20°C to give the acylated enamine. This reaction is usually allowed to stir overnight at room temperature. The total reaction mixture is then poured over crushed ice, stirred, and the mixture made acidic with 20% HCl. This treatment hydrolyzes the enamine to the acylated dicarbonyl compound. This
- 35

intermediate is then isolated by extraction and distillation to remove low boiling impurities, then reduced by sodium borohydride to the desired 1,3- diol.

METHOD D

Preparation of 1,4 Diols, by Aldol Condensation and Reduction

The typical reactions involve one or more aldehydes, one or more ketones, and mixtures thereof, which have at least one alpha-hydrogen atom on the carbon atom next to the carbonyl group. Typical examples of some reactants and some potential final products are as follows



The aldehyde, ketone, or mixture thereof which is to be condensed is placed in an autoclave under an inert atmosphere with a solvent such as butanol or with a phase transfer medium such as polyethylene glycol. When a mixed condensation such as with a ketone and an aldehyde is the target, typically the two reactants are used in about 1:1 mole ratio. A catalytic amount of strongly alkaline catalyst such as sodium methoxide is added, typically about 0.5-10 mole% of the reactants. The autoclave is sealed, and the mixture is heated at about 35-100°C until most of the original reactants have been converted, usually about 5 minutes to about 3 hours. The crude mixture is neutralized and the carbonyl functions present are reduced by hydrogenation over Raney Ni at about 100° C and about 50 atm for about 1 hour. Volatile components are removed by distillation and the desired diol principal solvents are obtained by vacuum distillation.

More information about this preparation process is disclosed in Synthesis, (3), 164-5 (1975), A. Pochini and R. Ungaro; PCT Int. Appl. WO 9,507,254, Kulmala et al, 16 Mar. 1995; Japan Pat. Appl. No. 40,333, Sato et al, 9 Feb. 1990; Japan Pat. Appl. No. 299,240, Sato et al, 4 Dec. 1989; Eur. Pat. Appl. No. 367,743, Ankner et al, 9 May 1990; all of said article and patents being incorporated herein by reference.

Illustrative Examples:**Condensation of Butyraldehyde and/or Isobutyraldehyde and Conversion to Form Eight-Carbon-1,3-Diols**

5 A portion of n-butanol (about 148 g, about 2 mole, Aldrich) in a 500 ml, 3-neck, round-bottom flask equipped with a stirring bar, internal thermometer, condenser, and connection for blanketing with a nitrogen atmosphere is treated with sodium metal (about 2.3 g, about 0.1 mole, Aldrich) until the sodium has all dissolved. Then, a mixture of butyraldehyde (about 72 g, about 1 mole, Aldrich) and isobutyraldehyde (about 72 g, about 10 1 mole, Aldrich) is added and the system is held at about 40°C until most of the original aldehydes have undergone reaction. The base catalyst is neutralized by careful addition of sulfuric acid, any salts are removed by filtration, and the solution is hydrogenated over Raney Ni at about 100°C at about 50 atm of pressure for about 1 hour to yield a mixture of 8-carbon,1,3-diols. The butanol solvent and any isobutanol formed during the 15 hydrogenation are removed by distillation to yield the eight-carbon-1,3-diol mixture of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; and 2-ethyl-4-methyl-1,3-pentanediol. Optionally, this mixture is further purified by vacuum distillation, or by decolorization with activated charcoal. The recovered solvent is used for further batches of diol production.

20 When only butyraldehyde is used in the reaction, the major product obtained is 2-ethyl-1,3-hexanediol.

 When only isobutyraldehyde is used in the reaction, the major product obtained is 2,2,4-trimethyl-1,3-pentanediol.

25 Mixed Condensation of Butyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

Condition A. A portion of n-butanol (about 148 g, about 2 mole, Aldrich) in a 500 ml, 3-neck, round-bottom flask equipped with a stirring bar, internal thermometer, condenser, and connection for blanketing with a nitrogen atmosphere is treated with sodium metal (about 2.3 g, about 0.1 mole, Aldrich) until the sodium has all dissolved. Then, a mixture 30 of butyraldehyde (about 72 g, about 1 mole, Aldrich) and 2-butanone (about 72 g, about 1 mole, Aldrich) is added and the system is held at about 40°C until most of the original butyraldehyde has undergone reaction. The base catalyst is neutralized by careful addition of sulfuric acid and any salts are removed by filtration. Optionally, unreacted starting materials are removed by distillation along with the reaction solvent. The mixture 35 containing the condensation products is hydrogenated over Raney Ni at about 100°C and about 50 atm. for about 1 hour to yield a mixture of 8-carbon-1,3-diols including 2-ethyl-

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1.3-hexanediol. 2-ethyl-3-methyl-1.3-pentanediol. 3.5-octanediol; 3-methyl-3,5-heptanediol; and lesser amounts of other 1.3-diol isomers. e.g., 3-methyl-2.4-heptanediol and 3.4-dimethyl-2.4-hexanediol. The crude diol mixture can be further purified by fractional distillation.

- 5 Condition B. The above reaction is repeated except that about 2 moles of butyraldehyde are used for each one mole of 2-butanone. This results in a reaction product with a higher proportion of diols resulting from self-condensation of the aldehyde (i.e., 2-ethyl-1.3-hexanediol), and from mixed condensation of aldehyde and 2-butanone (e.g., 2-ethyl-3-methyl-1.3-pentanediol and 3.5-octanediol), and a smaller proportion of those diols
10 resulting from self-condensation of 2-butanone (e.g., 3-methyl-3,5-heptanediol and 3.4-dimethyl-2.4-hexanediol).

- Condition C. The above condensation is repeated except that about one mole of 2-butanone is placed in the reaction vessel with the solvent and catalyst and about one mole of butyraldehyde is gradually added. Conditions are adjusted such that the self-
15 condensation rate of 2-butanone is slow and the more reactive carbonyl of the aldehyde reacts promptly upon addition. This results in a reaction product with a higher proportion of the diols resulting from the condensation of 2-butanone with butyraldehyde and from self-condensation of 2-butanone and a smaller proportion of the diol resulting from self-condensation of butyraldehyde.

- 20 Condition D. The above condensation C. is repeated under low temperature conditions. About 1.0 mole portion of 2-butanone is dissolved in about 5 volumes of dry tetrahydrofuran. The solution is cooled to about -78°C, and about 0.95 mole of potassium hydride is added in portions. After the hydrogen evolution has ceased, the solution is held for about one hour to allow for equilibration to the more stable enolate and then one mole
25 of n-butyraldehyde is added slowly with good stirring while maintaining the temperature at about -78°C. After addition is complete, the solution is allowed to gradually warm to room temperature and is neutralized by careful addition of sulfuric acid. Salts are removed by filtration. Optionally, unreacted starting materials are removed by distillation along with the reaction solvent. The mixture containing the condensation products is hydrogenated
30 over Raney Ni at about 100°C and about 50 atm. for about 1 hour to yield predominantly the diol resulting from the condensation of the enolate of 2-butanone with butyraldehyde, 3,5-octanediol. Purification is optionally accomplished by distillation.

Mixed Condensation of Isobutyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

The reaction of Condition A above is repeated except that the butyraldehyde is replaced by isobutyraldehyde. The condensation and reduction proceed analogously, and the final diol products are mainly 2,2,4-trimethyl-1,3-pentanediol; 2,2,3-trimethyl-1,3-pentanediol; 2-methyl-3,5-heptanediol; and 3-methyl-3,5-heptanediol.

Mixed Condensation of Butyraldehyde, Isobutyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

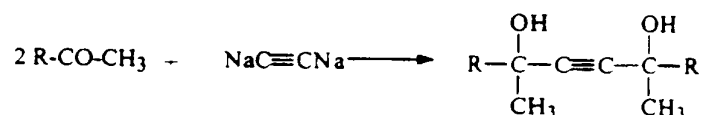
The reaction of Condition A above is repeated, except that about one mole each of butyraldehyde, isobutyraldehyde, and 2-butanone are used. The condensation and reduction proceed analogously to yield a mixture of 8-carbon-1,3-diols primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2,3-trimethyl-1,3-pentanediol; 2-methyl-3,5-heptanediol; and 3-methyl-3,5-heptanediol, along with other minor isomers resulting from condensation on the methylene of 2-butanone instead of the methyl.

The mixtures prepared by the condensation of butyraldehyde, isobutyraldehyde, and/or methyl ethyl ketone, preferably have no more than about 90%, preferably no more than about 80%, more preferably no more than about 70%, even more preferably no more than about 60%, and most preferably no more than about 50%, by weight of any one specific compound. Also, the reaction mixtures should not contain more than about 95%, preferably no more than about 90%, more preferably no more than about 85%, and most preferably no more than about 80%, by weight, of butyraldehyde or isobutyraldehyde.

METHOD E

25 Preparation of 1,4 Diols, by the Addition of Acetylide to Carbonyl Compounds

Dimetallic acetylides $\text{Na}^+ \text{:C}\equiv\text{C:}^- \text{Na}^+$ react with aldehydes or ketones to form unsaturated alcohols, e.g.,



The resulting acetylenic diol is then reduced to the alkene or completely reduced to the saturated diol. The reaction can also be done by using an about 18% slurry of mono-sodium acetylide with the carbonyl compound to form the acetylenic alcohol which can be converted to the sodium salt and reacted with another mole of carbonyl compound to give the unsaturated 1,4- diol. Where mixed carbonyl compounds are used with the

diacetylides, diol mixtures will result. Where the mono-acetylide is used, specific structures can be made in higher yields.

Illustrative Example: Preparation of 6-Methyl-2,5-heptanediol

A sodium acetylide (about 18% in xylene) slurry is reacted with isobutryaldehyde to form the acetylenic alcohol



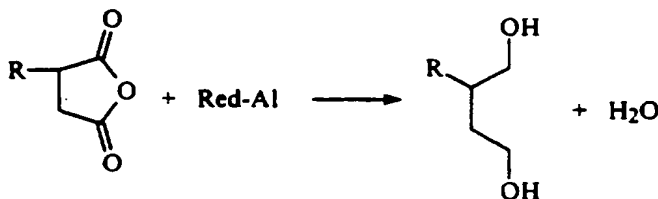
The acetylenic (ethynyl) alcohol is converted with base to the sodium acetylide $\text{R-CHOH-C}\equiv\text{CNa}$ which is then reacted with a mole of acetaldehyde to give the ethynyl diol $\text{R-CHOH-C}\equiv\text{C-CHOH-R'}$. This compound, $(\text{CH}_3)_2\text{CH-CHOH-C}\equiv\text{C-CHOH-CH}_3$, can be isolated as the unsaturated diol, if desired, reduced by catalytic hydrogenation to the corresponding material containing a double bond in place of the acetylenic bond, or further reduced by catalytic hydrogenation to the saturated 1,4- diol.

METHOD F

Preparation of Substituted Diols Derived from Cyclic Anhydrides, Lactones and Esters of Dicarboxylic Acids

This method of preparation is for the synthesis of diols, especially several 1,4-diols, which are derived from dicarboxylic acid anhydrides, diesters and lactones, but not limited to the 1,4-diols or four-carbon diacids.

These types of diols are generally synthesized by the reduction of the parent anhydride, lactone or diester with sodium bis(2-methoxyethoxy)aluminum hydride (Red-Al) as the reducing agent. This reducing agent is commercially available as a 3.1 molar solution in toluene and delivers one mole of hydrogen per mole of reagent. Diesters and cyclic anhydrides require about 3 moles of Red-Al per mole of substrate. Using an alkyl substituted succinic anhydride to illustrate this method, the typical reduction is carried out as follows.



The anhydride is first dissolved in anhydrous toluene and placed in a reaction vessel equipped with dropping funnel, mechanical stirrer, thermometer and a reflux condenser connected to calcium chloride and soda lime tubes to exclude moisture and

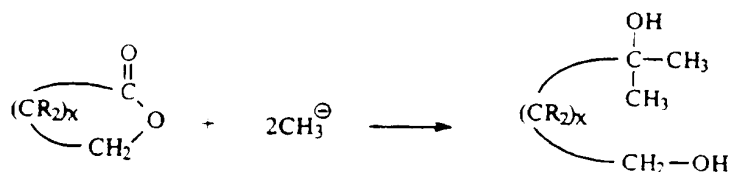
carbon dioxide. The reducing agent, in toluene, is placed in the dropping funnel and is added slowly to the stirred anhydride solution. The reaction is exothermic and the temperature is allowed to reach about 80°C. It is maintained at about 80°C during the remaining addition time and for about two hours following addition.

- 5 The reaction mixture is then allowed to cool back to room temperature. Next, the mixture is added to a stirred aqueous HCl solution (about 20% concentration) which is cooled in an ice bath, and the temperature is maintained at about 20 to 30°C. After acidification the mixture is separated in a separatory funnel and the organic layer washed with a dilute salt solution until neutral to pH paper. The neutral diol solution is dried over
10 anhydrous magnesium sulfate, filtered, then stripped under vacuum to yield the desired 1,4-diol.

METHOD G

Preparation of Diols with One or Both Alcohol Functions Being Secondary or Tertiary

- 15 This is a general method to prepare substituted diols from lactones and/or diesters by alkylation of the carboxyl group(s) using methyl magnesium bromide (Grignard reagent) or alkyl lithium compounds usually methyl lithium, e.g.,



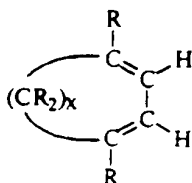
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This type of alkylation can be extended to diesters. An excess of methylating reagent will generate diols where both alcohol groups are tertiary.

METHOD H

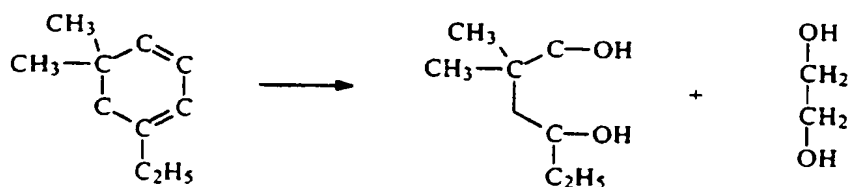
Preparation of Substituted 1,3-, 1,4- and 1,5-Diols

- 25 This method is a general preparation of some 1,3-, 1,4- and 1,5-diols which utilizes the chemistry outlined in Method A-1 and Method A-2. The variation here is the use of a cyclic alkadienes in place of the cycloalkenes described in Methods A. The general formula for the starting materials is



wherein each R is H. or C₁-C₄-alkyl and wherein x is 1, 2 or 3.

The reactions are those of Methods A with the variation of having one mole of ethylene glycol generated for each mole of the desired diol principal solvent formed, e.g., the following preparation of 2,2-dimethyl-1,4-hexanediol from 1-ethyl-5,5-dimethyl-1,3-cyclohexanediol (CAS No. 79419-18-4):



PREPARATION OF POLYETHOXYLATED DERIVATIVES

The polyethoxylated derivatives of diol principal solvents are typically prepared in a high-pressure reactor under a nitrogen atmosphere. A suitable amount of ethylene oxide is added to a mixture of a diol solvent and potassium hydroxide at high temperature (from about 80°C to about 170°C). The amount of ethylene oxide is calculated relative to the amount of the diol solvent in order to add the right number of ethylene oxide groups per molecule of diol. When the reaction is completed, e.g., after about 1 hour, residual unreacted ethylene oxide is removed by vacuum.

Illustrative Example: Preparation of Tetraethoxylated 3,3-Dimethyl-1,2-butanediol

To a 2-liter Parr reactor that is equipped for temperature control, is charged with about 354 grams (about 3.0 moles) of 3,3-dimethyl-1,2-butanediol and about 0.54 grams of potassium hydroxide. The reactor is sparged with nitrogen and evacuated three times to a pressure of about 30 mm Hg. The reactor is then filled again with nitrogen to atmospheric pressure, and heated to about 130°C. The pressure of the reactor is then adjusted to slightly below the atmospheric pressure by applying a slight vacuum. Ethylene oxide (about 528 grams, about 12.0 moles) is added over one hour while controlling the temperature to about 130°C. After about an additional one hour reaction time, the contents are cooled to about 90°C and a vacuum is pulled to remove any residual ethylene oxide.

PREPARATION OF METHYL-CAPPED POLYETHOXYLATED DERIVATIVES

Methyl-capped polyethoxylated derivatives of diols are typically prepared either by reacting a methoxypoly(ethoxy)ethyl chloride (i.e., CH₃O-(CH₂CH₂O)_n-CH₂CH₂-Cl) of the desired chain length with the selected diol, or by reacting a methyl-capped

polyethylene glycol (i.e., $\text{CH}_3\text{O}-(\text{CH}_2\text{CH}_2\text{O})_n-\text{CH}_2\text{CH}_2-\text{OH}$) of the desired chain length with the epoxy precursor of the diol, or a combination of these methods.

Illustrative Examples: Synthesis of $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}(\text{CH}_3)(\text{OCH}_2\text{CH}_2)_4\text{OCH}_3$, the methyl-capped tetraethoxylated derivative of 2-methyl-2,3-butanediol.

5 To a 1-liter, three-neck round bottom flask equipped with a magnetic stirbar, condenser, thermometer, and temperature controller (Thermowatch I²R)[®] is added tetraethylene glycol methyl ether (about 208 grams, about 1.0 mole) and sodium metal (Aldrich, about 2.3 grams, about 0.10 mole), and the mixture is heated to about 100°C under argon. After the sodium dissolves, 2-methyl-2,3-epoxybutane (about 86 grams, 10 about 1.0 mole) is added and the solution is stirred overnight under argon at about 120°C. A ¹³C-NMR (dmso-d₆) shows that the reaction is complete by the disappearance of the epoxide peaks. The reaction mixture is cooled, poured into an equal volume of water, 15 neutralized with 6 N HCl, saturated with sodium chloride, and extracted twice with dichloromethane. The combined dichloromethane layers are dried over sodium sulfate and solvent is stripped to yield the desired polyether alcohol in crude form. Optionally, purification is accomplished by fractional vacuum distillation.

Synthesis of Methoxytriethoxyethyl Chloride

To a 1-liter, three-neck round bottom flask equipped with a magnetic stirring bar, condenser, and temperature controller (Thermowatch, I²R) is added tetraethylene glycol 20 methyl ether (about 208 grams, about 1.0 mole) under argon. Thionyl chloride (about 256.0 grams, about 2.15 moles) is added dropwise with good stirring over about 3 hours, keeping the temperature in the 50-60°C range. The reaction mixture is then heated overnight at about 55°C. A ¹³C-NMR (D₂O) is taken which shows only a small peak at ~60ppm for unreacted alcohol and a sizable peak at ~43.5ppm representing chlorinated 25 product ($-\text{CH}_2\text{Cl}$). Saturated sodium chloride solution is slowly added to the material until the thionyl chloride is destroyed. The material is taken up in about 300 ml of saturated sodium chloride solution and extracted with about 500 ml of methylene chloride. The organic layer is dried and solvent is stripped on a rotary evaporator to yield crude methoxyethoxyethyl chloride. Optionally, purification is accomplished by 30 fractional vacuum distillation.

Synthesis of $\text{C}_2\text{H}_5\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CH}_2(\text{OCH}_2\text{CH}_2)_4\text{OCH}_3$, the Methyl-Capped Tetraethoxylated Derivative of 2-Methyl-1,3-pentanediol.

The alcohol, $\text{C}_2\text{H}_5\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$ (about 116 grams, about 1.0 mole), 35 is placed in a 1-liter, three-neck round bottom flask equipped with a magnetic stirring bar, condenser, and temperature controller (Thermowatch[®], I²R) along with about 100 ml of

tetrahydrofuran as solvent. To this solution, sodium hydride (about 32 grams, about 1.24 moles) is added in portions and the system is held at reflux until gas evolution ceases. Methoxytriethoxyethyl chloride (about 242 grams, about 1.2 moles, prepared as above) is added and the system is held at reflux for about 48 hours. The reaction mixture is cooled to room temperature and water is cautiously added dropwise with stirring to decompose excess hydride. The tetrahydrofuran is stripped off on a rotary evaporator. The crude product is dissolved in about 400 ml of water and enough sodium chloride is dissolved in the water to bring it nearly to the saturation level. The mixture is then extracted twice with about 300 ml portions of dichloromethane. The combined dichloromethane layers are dried over sodium sulfate and the solvent is then stripped on a rotary evaporator to yield the crude product. Optionally, purification is accomplished by further stripping of unreacted starting materials and low MW by-products by utilizing a kugelrohr apparatus at about 150°C under vacuum. Optionally, further purification is accomplished by vacuum distillation to yield the title polyether.

PREPARATION OF POLYPROPOXYLATED DERIVATIVES

A three neck, round bottom flask is equipped with a magnetic stir bar, a solid CO₂-cooled condenser, an addition funnel, a thermometer, and a temperature control device (Therm-O-Watch, I2R). The system is swept free of air by a stream of nitrogen and then is equipped for blanketing the reaction mixture with a nitrogen atmosphere. To the reaction flask is added the dry alcohol or diol to be propoxylated. About 0.1-5 mole % of sodium metal is added cautiously to the reaction vessel in portions with heating if necessary to get all the sodium to react. The reaction mixture is then heated to about 80-130°C and propylene oxide (Aldrich) is added dropwise from the dropping funnel at a rate to maintain a small amount of reflux from the solid CO₂-cooled condenser. Addition of propylene oxide is continued until the desired amount has been added for the target degree of propoxylation. Heating is continued until all reflux of propylene oxide ceases and the temperature is maintained for about an additional hour to ensure complete reaction. The reaction mixture is then cooled to room temperature and is neutralized by careful addition of a convenient acid such as methanesulfonic acid. Any salts are removed by filtration to give the desired propoxylated product. The average degree of propoxylation is typically confirmed by integration of the ¹H-NMR spectrum.

PREPARATION OF POLYBUTOXYLATED DERIVATIVES

A three neck, round bottom flask is equipped with a magnetic stir bar, a solid CO₂-cooled condenser, an addition funnel, a thermometer, and a temperature control device (Therm-O-Watch, I2R). The system is swept free of air by a stream of nitrogen

and then is equipped for blanketing the reaction mixture with a nitrogen atmosphere. To the reaction flask is added the dry alcohol or diol to be butoxylated. About 0.1-5 mole % of sodium metal is added cautiously to the reaction vessel in portions with heating if necessary to get all the sodium to react. The reaction mixture is then heated to about 80-130°C and α -butylene oxide (Aldrich) is added dropwise from the dropping funnel at a rate to maintain a small amount of reflux from the solid CO₂-cooled condenser. Addition of butylene oxide is continued until the desired amount has been added for the target degree of butoxylation. Heating is continued until all reflux of butylene oxide ceases and the temperature is maintained for about an additional one to two hours to ensure complete reaction. The reaction mixture is then cooled to room temperature and is neutralized by careful addition of a convenient acid such as methanesulfonic acid. Any salts are removed by filtration to give the desired butoxylated product. The average degree of butoxylation is typically confirmed by integration of the ¹H-NMR spectrum.

PREPARATION OF POLYTETRAMETHYLENEOXYLATED DERIVATIVES

A dry portion of about 0.1 mole of the desired alcohol or diol starting material is placed in a 3-neck, round bottom flask equipped with magnetic stirrer, condenser, internal thermometer and an argon blanketing system. If the desired average degree of "tetramethyleneoxylation" is about one per hydroxyl group, about 0.11 moles of 2-(4-chlorobutoxy)tetrahydropyran (ICI) is added per mole of alcohol function. A solvent is added if necessary such as dry tetrahydrofuran, dioxane or dimethylformamide. Then sodium hydride (about 5 mole % excess relative to the chloro compound) is added in small portions with good stirring while maintaining a temperature of about 30-120°C. After all the hydride has reacted, the temperature is maintained until all of the alcohol groups have been alkylated, usually about 4-24 hours. After the reaction is complete, it is cooled and the excess hydride is decomposed by careful addition of methanol in small portions. Then about an equal volume of water is added and the pH is adjusted to about 2 with sulfuric acid. After warming to about 40°C and holding it there for about 15 minutes to hydrolyze the tetrahydropyranyl protecting group, the reaction mixture is neutralized with sodium hydroxide and the solvents are stripped on a rotary evaporator. The residue is taken up in ether or methylene chloride and salts are removed by filtration. Stripping yields the crude tetramethyleneoxylated alcohol or diol. Further purification may be accomplished by vacuum distillation. If a final average degree of tetramethyleneoxylation of less than one is desired, a correspondingly lesser amount of chloro compound and hydride are used. For average degrees of tetramethyleneoxylation

greater than one, the entire process is repeated in cycles until the buildup reaches the target level.

PREPARATION OF ALKYL AND ARYL MONOGLYCERYL ETHERS

A convenient method to prepare alkyl and/or aryl monoglycerol ethers consists of first preparing the corresponding alkyl glycidyl ether precursor. This is then converted to a ketal, which is then hydrolyzed to the monoglyceryl ether (diol). Following is the illustrative example of the preparation of the preferred n-pentyl monoglycerol ether, (i.e., 3-(pentyloxy)-1,2-propanediol) $n\text{-C}_5\text{H}_{11}\text{-O-CHOH-CH}_2\text{OH}$.

Preparation of 3-(pentyloxy)-1,2-propanediol

A 3-neck, 2-liter round bottomed reaction flask (equipped with overhead stirrer, cold water condenser, mercury thermometer and addition funnel) are charged with about 546 g of aqueous NaOH (about 50% concentration) and about 38.5 g of tetrabutylammonium hydrogen sulfate (PTC, phase transfer catalyst). The content of the flask is stirred to achieve dissolution and then about 200 g of 1-pentanol is added along with about 400 ml hexanes (a mixture of isomers, with about 85% n-hexane). Into the addition funnel is charged about 418 g of epichlorohydrin which is slowly added (dropwise) to the stirring reaction mix. The temperature gradually rises to about 68°C due to the reaction exotherm. The reaction is allowed to continue for about 1 hr after complete addition of the epichlorohydrin (no additional heat).

The crude reaction mix is diluted with about 500 ml of warm water, stirred gently and then the aqueous layer is settled and removed. The hexane layer is mixed diluted again with about 1 liter of warm water and the pH of the mix is adjusted to about 6.5 by the addition of dilute aqueous sulfuric acid. The water layer is again separated and discarded and the hexane layer is then washed 3 times with fresh water. The hexane layer is then separated and evaporated to dryness via a rotary evaporator to obtain the crude n-pentyl glycidyl ether.

Acetonation (Conversion to the Ketal)

A 3-neck, 2 liter round bottomed flask (equipped with an overhead stirrer, cold water condenser, mercury thermometer and addition funnel) is charged with about 1 liter of acetone. To the acetone is added about 1 ml of SnCl_4 with stirring. Into an addition funnel positioned over the reaction flask is added about 200 g of the just prepared n-pentyl glycidyl ether. The glycidyl ether is added very slowly to the stirring acetone solution (the rate is adjusted to control the exotherm). The reaction is allowed to proceed for about 1 hr after complete addition of the glycidyl ether (maximum temperature about 52°C).

Hydrolysis

The apparatus is converted for distillation and a heating mantle and temperature controller are added. The crude reaction mix is concentrated via distillation of about 600 ml of acetone. To the cooled concentrated solution are added about 1 liter of aqueous
5 sulfuric acid (about 20% concentration) and about 500 ml of hexanes. The content of the flask is then heated to about 50°C with stirring (the apparatus is adjusted to collect and separate the liberated acetone). The hydrolysis reaction is continued until TLC (Thin Layer Chromatography) analysis confirms the completion of reaction.

The crude reaction mix is cooled and the aqueous layer is separated and discarded.
10 The organic layer is then diluted with about 1 liter of warm water and the pH is adjusted to about 7 by the addition of dilute aqueous NaOH (1N). The aqueous layer is again separated and the organic phase is washed 3 times with fresh water. The organic phase is then separated and evaporated via a rotary evaporator. The residue is then diluted with
15 fresh hexanes and the desired product is extracted into methanol/water solution (about 70/30 weight ratio). The methanol/water solution is again evaporated to dryness via a rotary evaporator (with additional methanol added to facilitate the water evaporation). The residue is then filtered hot through glass microfiber filter paper to obtain the n-pentyl monoglycerol ether.

PREPARATION OF DI(HYDROXYALKYL) ETHERS

20 Synthesis of bis(2-hydroxybutyl) ether

A 500 ml, three neck, round bottom flask equipped with magnetic stirrer, internal thermometer, addition funnel, condenser, argon supply, and heating mantle, is flushed with argon. Then 1,2-butanediol (about 270g, about 3 moles, Aldrich) is added and sodium metal (about 1.2 g, about 0.05 moles, Aldrich) is added and the sodium is allowed
25 to dissolve. Then the reaction mixture is heated to about 100°C and epoxybutane (about 71g, about 1 mole, Aldrich) is added dropwise with stirring. Heating is continued until the reflux of epoxybutane has ceased and heating is continued for an additional hour to drive the conversion to completion. The reaction mixture is neutralized with sulfuric acid, the salts are removed by filtration, and the liquid is fractionally distilled under
30 vacuum to recover the excess butanediol. The desired ether is obtained as a residue. Optionally, it is purified by further vacuum distillation.

Synthesis of bis(2-hydroxycyclopentyl) ether

A 1-liter, three neck, round bottom flask equipped with magnetic stirrer, internal thermometer, addition funnel, condenser, argon supply, and heating mantle, is flushed
35 with argon. Then 1,2-cyclopentanediol (about 306 g, about 3 moles, Aldrich) is added

and boron trifluoride diethyl etherate (about 0.14 g. about 0.01 moles, cis-trans isomer mixture, Aldrich) is added. Then the reaction mixture is held at about 10-40°C as cyclopentene oxide (about 84 g. about 1 mole, Aldrich) is added dropwise with stirring until all the cyclopentene oxide has reacted. The reaction mixture is neutralized with sodium hydroxide, and the liquid is fractionally distilled under vacuum to recover the excess cyclopentanediol. The desired ether is obtained as a residue. Optionally, it is purified by further vacuum distillation.

The above disclosed methods are illustrative only, for purposes of assisting those skilled in the art in the practice of the invention, and are not limiting.

In the specification and examples herein, all percentages, ratios and parts are by weight unless otherwise specified and all numerical limits are normal approximations. All documents cited are, in relevant part, incorporated herein by reference.

The following are non-limiting examples of the present invention:

The following are suitable N,N-di(unsaturated fatty acyl-oxyethyl)-N,N-dimethyl ammonium chloride fabric softening actives (DEQA's), with approximate distributions of fatty acyl groups given, that are used hereinafter for preparing the following compositions.

Fatty Acyl Group	DEQA ¹	DEQA ²	DEQA ³	DEQA ⁴	DEQA ⁵
C12	trace	trace	0	0	0
C14	3	3	0	0	0
C16	4	4	5	5	5
C18	0	0	5	6	6
C14:1	3	3	0	0	3
C16:1	11	7	0	0	3
C18:1	74	73	71	68	67
C18:2	4	8	8	11	11
C18:3	0	1	1	2	2
C20:1	0	0	2	2	2
C20 and up	0	0	2	0	0
Unknowns	0	0	6	6	7
Total	99	99	100	100	102
IV	86-90	88-95	99	100	95
cis/trans	20-30	20-30	4	5	5
TPU	4	9	10	13	13

TPU = Total polyunsaturated fatty acyl groups, by weight.

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	<u>Fatty Acyl Group</u>	<u>DEQA⁶</u>	<u>DEQA⁷</u>	<u>DEQA⁸</u>
	C14	0	1	0
	C16	11	25	5
	C18	4	20	14
5	C14:1	0	0	0
	C16:1	1	0	1
	C18:1	27	45	74
	C18:2	50	6	3
	C18:3	7	0	0
10	Other	0	3	3
	<i>Total</i>	100	100	100
	IV	125-138	56	Not Available
	cis/trans (C18:1)	Not Available	7	Not Available
	TPU	57	6	Not Available

15

The following are suitable N,N-di(branched chain fatty acyl-oxyethyl)-N,N-dimethyl ammonium chloride fabric softening actives (DEQA's), with approximate distributions of fatty acyl groups given, that are used hereinafter for preparing the following compositions.

20

	<u>Fatty Acyl Group</u>	<u>DEQA¹⁰</u>	<u>DEQA¹¹</u>	<u>DEQA¹²</u>
	Isomyristic acid	--	1-2	--
	Myristic acid	7-11	0.5-1	--
	Isopalmitic acid	6-7	6-7	1-3
	Palmitic acid	4-5	6-7	--
25	Isostearic acid	70-76	80-82	60-66
	Stearic acid	--	2-3	8-10
	Isooleic acid	--	--	13-17
	Oleic acid	--	--	6-12
30	IV	3	2	7-12

Softener**Actives****DEQA¹³****DEQA¹⁴****DEQA¹⁵****DEQA¹⁶**Fatty Acyl
GroupBranched
fatty acid 1Branched
fatty acid 2Branched
fatty acid 3Branched
fatty acid 4

	<u>Softener Actives</u>	<u>DEQA¹⁷</u>	<u>DEQA¹⁸</u>	<u>DEQA¹⁹</u>	<u>DEQA²⁰</u>
	Fatty Acyl Group	α -Heptyl decanoic acid	9- and 10- Methoxy octadecanoic acids	9- and 10- Isopropoxy- octadecanoic acids	Methoxyocta- decanoic acid isomeric mixture
	<u>Softener Actives</u>	<u>DEQA²¹</u>	<u>DEQA²²</u>	<u>DEQA²³</u>	
5	Fatty Acyl Group	Phenyl octadecanoic acid	Methylphenyl- octadecanoic acids	Phenoxyoctadecanoic acid	
	<u>Softener Active</u>	<u>DEQA²⁴</u>	<u>DEQA²⁵</u>		
10	Fatty Acyl Group	65:35 Mixture of fatty acids used to make DEQA ² and DEQA ¹⁰	65:35 Mixture of fatty acids used to make DEQA ⁸ and DEQA ¹⁰		

The following Examples show clear, or translucent, products with acceptable viscosities.

- 15 The compositions in the Examples below are made by first preparing a softener premix by blending at room temperature the appropriate branched DEQA and unsaturated DEQA actives. The softener actives can be heated to melting at, e.g., about 130-150°F (about 55-66°C), if the softener active(s) is not fluid at room temperature. The softener active is mixed using an IKA RW 25® mixer for about 2 to about 5 minutes at about 150
- 20 rpm. Separately, an acid/water seat is prepared by mixing the HCl with deionized (DI) water at room temperature. If the softener actives and/or the principal solvent(s) are not fluid at room temperature and need to be heated, the acid/water seat should also be heated to about 100°F (about 38°C) and maintaining said temperature with a water bath. The principal solvent(s) (melted at suitable temperatures if their melting points are above
- 25 room temperature) are added to the softener premix and said premix is mixed for about 5 minutes. The acid/water seat is then added to the softener premix and mixed for about 20 to about 30 minutes or until the composition is clear and homogeneous. The composition is allowed to air cool to ambient temperature, if necessary.

EXAMPLES 1 TO 6

<u>Ingredients</u>				<u>Ex. 1</u>	<u>Ex. 2</u>	<u>Ex. 3</u>	<u>Ex. 4</u>	<u>Ex. 5</u>	<u>Ex. 6</u>
				<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	(85% active in ethanol)			19.9	--	15.3	--	32.5	--
DEQA ⁸	(85% active in ethanol)			--	19.9	--	15.3	--	32.5
DEQA ¹⁰	(85% active in ethanol)			10.7	10.7	15.3	15.3	17.5	17.5
Ethanol				--	--	2	2	2	2
1,2-Hexanediol				18	18	18	18	28	28
Perfume				1.2	1.2	1	1.35	1.3	1.3
HCl (pH 2-3.5)				0.005	0.005	0.005	0.005	0.005	0.005
Distilled Water				Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

5

EXAMPLES 7 TO 12

<u>Ingredients</u>				<u>Ex. 7</u>	<u>Ex. 8</u>	<u>Ex. 9</u>	<u>Ex. 10</u>	<u>Ex. 11</u>	<u>Ex. 12</u>
				<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	(85% active in ethanol)			19.9	--	--	--	32	--
DEQA ⁸	(85% active in ethanol)			--	--	19.9	19	--	19
DEQA ¹¹	(85% active in ethanol)			10.7	--	--	--	--	--
DEQA ¹²	(85% active in ethanol)			--	28	--	--	--	--
DEQA ¹³	(85% active in ethanol)			--	--	5.4	--	--	--
DEQA ¹⁴	(85% active in ethanol)			--	--	5.4	--	--	--
DEQA ¹⁵	(85% active in ethanol)			--	--	--	5	9	--
DEQA ¹⁶	(85% active in ethanol)			--	--	--	6	9	--
DEQA ¹⁸	(85% active in ethanol)			--	--	--	--	--	6
DEQA ¹⁹	(85% active in ethanol)			--	--	--	--	--	6
1,2-Hexanediol				18	15	18	18	28	18
Ethanol				--	1	--	--	--	1
Perfume				1.2	1	1.2	1.35	2	1.3

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HCl (pH 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005
Distilled Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLES 13 TO 18

<u>Ingredients</u>			<u>Ex. 13</u>	<u>Ex. 14</u>	<u>Ex. 15</u>	<u>Ex. 16</u>	<u>Ex. 17</u>	<u>Ex. 18</u>
			<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	(85% active in	ethanol)	19.9	--	--	19.9		
DEQA ⁶	(85% active in	ethanol)	--	17	--	--	--	--
DEQA ⁸	(85% active in	ethanol)	--	--	19.9	--	--	--
DEQA ⁹	(85% active in	ethanol)	--				19.9	19.9
DEQA ¹⁰	(85% active in	ethanol)	--	6.8	7	7	7	7
DEQA ¹¹	(85% active in	ethanol)	5.3	--	--	--	--	--
DEQA ²⁰	(85% active in	ethanol)	5.3	--	--	--	--	--
DEQA ²¹	(85% active in	ethanol)	--	6.8	--	--	--	--
DEQA ²²	(85% active in	ethanol)	--	--	3.7	--	--	--
DEQA ²³	(85% active in	ethanol)	--	--	--	3.7	--	--
DEQA ²⁴	(85% active in	ethanol)	--	--	--	--	3.7	--
DEQA ²⁵	(85% active in	ethanol)	--	--	--	--	--	3.7
1,2-Hexanediol			9	9	18	18	18	9
2-Ethyl-1,3-hexanediol			8	--	--	--		9
2,2,4-Trimethyl-1,3-pentanediol			--	9	--	--		
Ethanol			2	--	--	--	--	--
Perfume			1.2	1.2	1.2	1.2	1.2	1.2
HCl (pH 2-3.5)			0.005	0.005	0.005	0.005	0.005	0.005
Distilled Water			Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLES 19 - 21

<u>Ingredients</u>	<u>Ex. 19</u> <u>Wt. %</u>	<u>Ex. 20</u> <u>Wt. %</u>	<u>Ex. 3</u> <u>Wt. %</u>
DEQA ²⁴ (85% active in ethanol)	30	--	15
DEQA ²⁵ (85% active in ethanol)	--	30	15
1,2-Hexanediol	18	18	18
HCl (pH 2-3.5)	0.005	0.005	0.005
Distilled Water	Bal.	Bal.	Bal.

The above Examples show clear, or translucent, products with acceptable viscosities.

The compositions of Examples 22 are made at ambient temperature by the following process:

1. Prepare the water seat containing HCl.
2. Separately, mix perfume and Tenox antioxidant to the diester softener active.
3. Add the diester active blend into the water seat with mixing.
4. Add about 10-20% of the CaCl₂ solution at approximately halfway through the diester addition.
5. Add the remainder of the CaCl₂ solution after the diester addition is complete with mixing.

EXAMPLES 22 TO 27

<u>Ingredients</u>	<u>Ex. 22</u> <u>Wt. %</u>	<u>Ex. 23</u> <u>Wt. %</u>	<u>Ex. 24</u> <u>Wt. %</u>	<u>Ex. 25</u> <u>Wt. %</u>	<u>Ex. 26</u> <u>Wt. %</u>	<u>Ex. 27</u> <u>Wt. %</u>
DEQA ² (85% active in ethanol)	18	--	15	--	--	--
DEQA ⁸ (85% active in ethanol)	--	18	--	12	--	--
DEQA ¹⁰ (85% active in ethanol)	9.2	9.2	15	12	--	--
DEQA ²⁴ (85% active in ethanol)	--	--	--	--	20.8	--
DEQA ²⁵ (85% active in ethanol)	--	--	--	--	--	28
Perfume	1.35	1.35	1.35	1.35	1.35	1.35
Tenox 6	0.04	0.04	0.04	0.04	0.04	0.04
CaCl ₂ (25% solution)	2	2	2	2	2	2
HCl 1N	0.30	0.30	0.30	0.30	0.30	0.30
Distilled Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

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The above Examples show dispersion compositions with good stability and performance.

PROCESSING ASPECTS

5 The principal solvents B. and some mixtures of principal solvents B. and secondary solvents, as disclosed hereinbefore, allow the preparation of premixes comprising the softener active A. (from about 55% to about 85%, preferably from about 60% to about 80%, more preferably from about 65% to about 75%, by weight of the premix); the principal solvent B. (from about 10% to about 30%, preferably from about 10
10 13% to about 25%, more preferably from about 15% to about 20%, by weight of the premix); and optionally, the water soluble solvent C (from about 5% to about 20%, preferably from about 5% to about 17%, more preferably from about 5% to about 15%, by weight of the premix). The principal solvents B. can optionally be replaced by a mixture of an effective amount of principal solvents B. and some inoperable solvents, as disclosed
15 hereinbefore. These premixes contain the desired amount of fabric softening active A. and sufficient principal solvent B., and, optionally, solvent C., to give the premix the desired viscosity for the desired temperature range. Typical viscosities suitable for processing are less than about 1000 cps, preferably less than about 500 cps, more preferably less than about 300 cps. Use of low temperatures improves safety, by
20 minimizing solvent vaporization, minimizes the degradation and/or loss of materials such as the biodegradable fabric softener active, perfumes, etc., and reduces the need for heating, thus saving on the expenses for processing. Additional protection for the softener active can be provided by adding, e.g., chelant such as ethylenediaminepentaacetic acid, during preparation of the active. The result is improved
25 environmental impact and safety from the manufacturing operation.

 Examples of premixes and processes using them include premixes which typically contain from about 55% to about 85%, preferably from about 60% to about 80%, more preferably from about 65% to about 75%, of fabric softener active A., as exemplified in the above Examples, mixed with from about 10% to about 30%, preferably from about 10
30 13% to about 25%, more preferably from about 15% to about 20%, of principal solvent such as 1,2-hexanediol, and from about 5% to about 20%, preferably from about 5% to about 15%, of water soluble solvent C. like ethanol and/or isopropanol.

 These premixes can be used to formulate finished compositions in processes comprising the steps of:

35 1. Make premix of fabric softening active, about 11% ethanol, and about 17% principal solvent, let cool to ambient temperature.

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2. Mix perfume in the premix.
3. Make up water seat of water and HCl at ambient temperature. Optionally add chelant.
4. Add premix to water under good agitation.
5. Trim with CaCl_2 solution to desired viscosity.
- 5 6. Add dye solution to get desired colour.

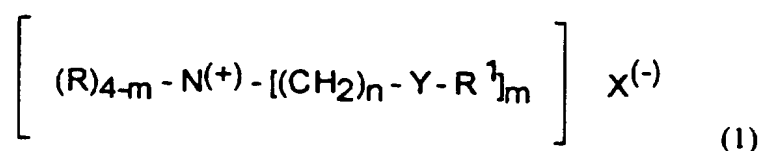
The fabric softening actives (DEQAs): the principal solvents B.: and, optionally, the water soluble solvents, can be formulated as premixes which can be used to prepare the above compositions.

- 10 For commercial purposes, the above clear compositions are introduced into containers, specifically bottles, and more specifically clear bottles (although translucent bottles can be used), made from polypropylene (although glass, oriented polyethylene, etc., can be substituted), the bottle having a light blue tint to compensate for any yellow color that is present, or that may develop during storage (although, for short times, and
- 15 perfectly clear products, clear containers with no tint, or other tints, can be used), and having an ultraviolet light absorber in the bottle to minimize the effects of ultraviolet light on the materials inside, especially the highly unsaturated actives (the absorbers can also be on the surface). The overall effect of the clarity and the container being to demonstrate the clarity of the compositions, thus assuring the consumer of the quality of the product.

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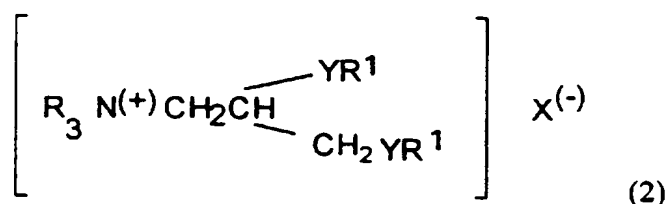
1. Biodegradable fabric softener actives having formulas selected from the group consisting of:

1.



wherein each R substituent is hydrogen or a short chain C₁-C₆ alkyl or hydroxyalkyl group; each m is 2 or 3; each n is from 1 to about 4; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C-, is C₆-C₂₂, but no more than one R¹, or YR¹, sum being less than about 12 and then the other R¹, or YR¹, sum is at least about 16, with each R¹ comprising a long chain C₅-C₂₁ branched alkyl or unsaturated alkyl, optionally substituted, the ratio of branched alkyl to unsaturated alkyl being from about 5:95 to about 95:5, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from about 20 to about 140, and wherein the counterion, X⁻, can be any softener-compatible anion;

2. softener having the formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before; and

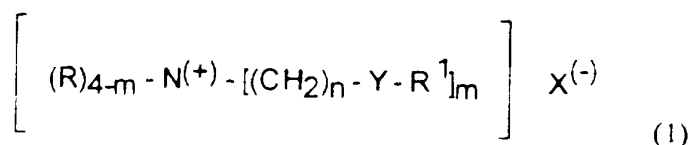
3. mixtures thereof;

the softener active optionally containing up to about 20% of mono-long chain softener in which one YR¹ group is -OH, -N(R)H, or -C(O)OH, and,

in said fabric softener active, preferably, each R substituent is hydrogen or a short chain C₁-C₃ alkyl or hydroxyalkyl group; each n is 2; each Y is -O-(O)C-; the sum of carbons in each R¹ plus one is C₁₂-C₂₂, and R¹ is branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 75:25 to about 25:75, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from

about 50 to about 130; and wherein the counterion, X^- , is selected from the group consisting of: chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, and, even more preferably, each R substituent is selected from the group consisting of: methyl, ethyl, propyl, hydroxyethyl, and benzyl; each m is 2; each n is 2; each Y is $-O-(O)C-$; the sum of carbons in each R^1 , plus one is $C_{14}-C_{20}$, with each R^1 being a long chain $C_{13}-C_{19}$ branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 50:50 to about 30:70, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R^1 group is from about 70 to about 115; and wherein the counterion, X^- , is chloride.

2. The fabric softener active of Claim 1 having the formula:



wherein each R substituent is hydrogen or a short chain C_1-C_6 alkyl or hydroxyalkyl group; each m is 2 or 3; each Y is $-O-(O)C-$; the sum of carbons in each R^1 , plus one, is C_6-C_{22} , but no more than one YR^1 sum being less than about 12 and then the other YR^1 sum is at least about 16, with each R^1 being a long chain C_5-C_{21} branched alkyl or unsaturated alkyl, optionally substituted, the ratio of branched alkyl to unsaturated alkyl being from about 75:25 to about 25:75, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R^1 group is from about 50 to about 130, and, preferably, wherein each R substituent is hydrogen or a short chain C_1-C_3 alkyl or hydroxyalkyl group; each n is 2; the sum of carbons in each R^1 plus one is $C_{12}-C_{20}$; and wherein the counterion, X^- , is selected from the group consisting of: chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, and, even more preferably, wherein each R substituent is selected from the group consisting of: methyl, ethyl, propyl, hydroxyethyl, and benzyl; each m is 2; each n is 2; the sum of carbons in each R^1 , plus one is $C_{14}-C_{20}$, with each R^1 being a long chain $C_{13}-C_{19}$ branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 50:50 to about 30:70; for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R^1 group is from about 70 to about 115; and wherein the counterion, X^- , is chloride.

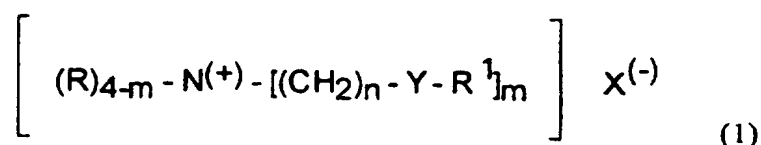
3. The fabric softener active of Claim 1 or Claim 2 comprising mixtures of compounds containing (1) primarily branched chain alkyl R^1 groups and (2) primarily unsaturated alkyl R^1 groups.

4. The fabric softener active of Claim 1 or Claim 2 comprising compounds containing mixtures of (1) primarily branched chain alkyl R^1 groups and (2) primarily unsaturated alkyl R^1 groups.

5. Fabric softener composition comprising:

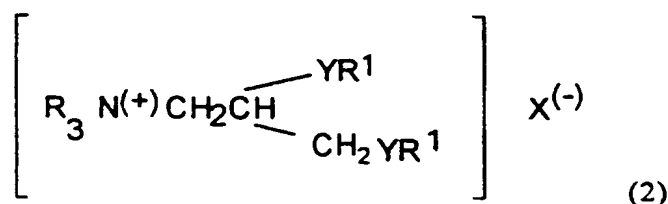
A. from about 2% to about 80%, preferably from about 13% to about 75%, and more preferably from about 15% to about 70%, by weight of the composition, of biodegradable fabric softener active selected from the group consisting of:

1. softener having the formula:



wherein each R substituent is hydrogen or a short chain C_1 - C_6 alkyl or hydroxyalkyl group; each m is 2 or 3; each n is from 1 to about 4; each Y is $-O-(O)C-$, $-(R)N-(O)C-$, $-C(O)-N(R)-$, or $-C(O)-O-$; the sum of carbons in each R^1 , plus one when Y is $-O-(O)C-$ or $-(R)N-(O)C-$, is C_6 - C_{22} , but no more than one R^1 , or YR^1 , sum being less than about 12 and then the other R^1 , or YR^1 , sum is at least about 16, with each R^1 comprising a long chain C_5 - C_{21} branched alkyl or unsaturated alkyl, optionally substituted, the ratio of branched alkyl to unsaturated alkyl being from about 5:95 to about 95:5, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R^1 group is from about 20 to about 140, and wherein the counterion, X^- , can be any softener-compatible anion;

2. softener having the formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before;

3. mixtures thereof, and,

preferably, wherein, in said softener active, each R substituent is hydrogen or a short chain C₁-C₃ alkyl or hydroxyalkyl group; each n is 2; each Y is -O-(O)C-; the sum of carbons in each R¹ plus one is C₁₂-C₂₂, and R¹ is branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 75:25 to about 25:75, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from about 50 to about 130; and wherein the counterion, X⁻, is selected from the group consisting of: chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate; and

more preferably, wherein, in said softener active, each R substituent is selected from the group consisting of: methyl, ethyl, propyl, hydroxyethyl, and benzyl; each m is 2; each n is 2; each Y is -O-(O)C-; the sum of carbons in each R¹, plus one is C₁₄-C₂₀, with each R¹ being a long chain C₁₃-C₁₉ branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 50:50 to about 30:70, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from about 70 to about 115; and wherein the counterion, X⁻, is chloride; and

the softener active optionally containing up to about 20% of mono-long chain softener in which one YR¹ group is -OH, -N(R)H, or -C(O)OH;

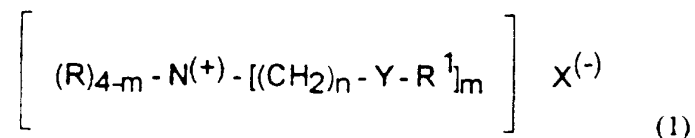
B. optionally, less than about 40%, by weight of the composition of principal solvent having a ClogP of from about 0.15 to about 0.64;

C. optionally, an effective amount, sufficient to improve clarity, of low molecular weight water soluble solvents selected from the group consisting of: ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate, and mixtures thereof, said water soluble solvents being at a level that will not form clear compositions by themselves;

D. optionally, an effective amount to improve clarity, of water soluble calcium and/or magnesium salt; and

E. the balance being water.

6. The fabric softener composition of Claim 9 containing from about 15% to about 70% of said softener active, wherein, said fabric softener active has the formula:



wherein each R substituent is hydrogen or a short chain C₁-C₆ alkyl or hydroxyalkyl group; each m is 2 or 3; each Y is -O-(O)C-; the sum of carbons in each R¹, plus one is C₆-C₂₂, but no more than one YR¹ sum being less than about 12 and then the other YR¹ sum is at least about 16, with each R¹ being a long chain C₅-C₂₁ branched alkyl or unsaturated alkyl, optionally substituted, the ratio of branched alkyl to unsaturated alkyl being from about 75:25 to about 25:75, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from about 50 to about 130, and, preferably,

wherein each R substituent is hydrogen or a short chain C₁-C₃ alkyl or hydroxyalkyl group; each n is 2; the sum of carbons in each R¹ plus one is C₁₂-C₂₀; and wherein the counterion, X⁻, is selected from the group consisting of: chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, and, even more preferably,

wherein each R substituent is selected from the group consisting of: methyl, ethyl, propyl, hydroxyethyl, and benzyl; each m is 2; each n is 2; the sum of carbons in each R¹, plus one is C₁₄-C₂₀, with each R¹ being a long chain C₁₃-C₁₉ branched alkyl or unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl being from about 50:50 to about 30:70; for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is from about 70 to about 115; and wherein the counterion, X⁻, is chloride.

7. The fabric softener composition of Claim 5 or Claim 6 wherein said ClogP is from about 0.25 to about 0.62, preferably from about 0.40 to about 0.60.

8. The fabric softener composition of any of Claims 5-7 wherein at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is from about 55:45 to about 85:15, preferably from about 60:40 to about 80:20; at water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is from about 45:55 to about 70:30, preferably from about 55:45 to about 70:30; and at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is from about 30:70 to about 55:45, preferably from about 35:65 to about 45:55.

9. The fabric softener composition of any of Claims 5-8 wherein said principal solvent is selected from the group consisting of:

I. mono-ols including:

- a. n-propanol; and/or
- b. 2-butanol and/or 2-methyl-2-propanol;

II. hexane diol isomers including: 2,3-butanediol, 2,3-dimethyl-, 1,2-butanediol, 2,3-dimethyl-, 1,2-butanediol, 3,3-dimethyl-, 2,3-pentanediol, 2-methyl-, 2,3-pentanediol, 3-methyl-, 2,3-pentanediol, 4-methyl-, 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-, 1,2-pentanediol, 2-methyl-, 1,2-pentanediol, 3-methyl-, 1,2-pentanediol, 4-methyl-, and/or 1,2-hexanediol;

III. heptane diol isomers including: 1,3-propanediol, 2-butyl-, 1,3-propanediol, 2,2-diethyl-, 1,3-propanediol, 2-(1-methylpropyl)-, 1,3-propanediol, 2-(2-methylpropyl)-, 1,3-propanediol, 2-methyl-2-propyl-, 1,2-butanediol, 2,3,3-trimethyl-, 1,4-butanediol, 2-ethyl-2-methyl-, 1,4-butanediol, 2-ethyl-3-methyl-, 1,4-butanediol, 2-propyl-, 1,4-butanediol, 2-isopropyl-, 1,5-pentanediol, 2,2-dimethyl-, 1,5-pentanediol, 2,3-dimethyl-, 1,5-pentanediol, 2,4-dimethyl-, 1,5-pentanediol, 3,3-dimethyl-, 2,3-pentanediol, 2,3-dimethyl-, 2,3-pentanediol, 2,4-dimethyl-, 2,3-pentanediol, 3,4-dimethyl-, 2,3-pentanediol, 4,4-dimethyl-, 3,4-pentanediol, 2,3-dimethyl-, 1,5-pentanediol, 2-ethyl-, 1,6-hexanediol, 2-methyl-, 1,6-hexanediol, 3-methyl-, 2,3-hexanediol, 2-methyl-, 2,3-hexanediol, 3-methyl-, 2,3-hexanediol, 4-methyl-, 2,3-hexanediol, 5-methyl-, 3,4-hexanediol, 2-methyl-, 3,4-hexanediol, 3-methyl-, 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; and/or 1,6-heptanediol;

IV. octane diol isomers including: 1,3-propanediol, 2-(2-methylbutyl)-, 1,3-propanediol, 2-(1,1-dimethylpropyl)-, 1,3-propanediol, 2-(1,2-dimethylpropyl)-, 1,3-propanediol, 2-(1-ethylpropyl)-, 1,3-propanediol, 2-(1-methylbutyl)-, 1,3-propanediol, 2-(2,2-dimethylpropyl)-, 1,3-propanediol, 2-(3-methylbutyl)-, 1,3-propanediol, 2-butyl-2-methyl-, 1,3-propanediol, 2-ethyl-2-isopropyl-, 1,3-propanediol, 2-ethyl-2-propyl-, 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-, 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-, 1,3-propanediol, 2-tertiary-butyl-2-methyl-, 1,3-butanediol, 2,2-diethyl-, 1,3-butanediol, 2-(1-methylpropyl)-, 1,3-butanediol, 2-butyl-, 1,3-butanediol, 2-ethyl-2,3-dimethyl-, 1,3-butanediol, 2-(1,1-dimethylethyl)-, 1,3-butanediol, 2-(2-methylpropyl)-, 1,3-butanediol, 2-methyl-2-isopropyl-, 1,3-butanediol, 2-methyl-2-propyl-, 1,3-butanediol, 3-methyl-2-isopropyl-, 1,3-butanediol, 3-methyl-2-propyl-, 1,4-butanediol, 2,2-diethyl-, 1,4-butanediol, 2-methyl-2-propyl-, 1,4-butanediol, 2-(1-methylpropyl)-, 1,4-butanediol, 2-ethyl-2,3-dimethyl-, 1,4-butanediol, 2-ethyl-3,3-dimethyl-, 1,4-butanediol, 2-(1,1-dimethylethyl)-, 1,4-butanediol, 2-(2-methylpropyl)-, 1,4-butanediol, 2-methyl-3-propyl-, 1,4-butanediol, 3-methyl-2-isopropyl-, 1,3-pentanediol, 2,2,3-trimethyl-

; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-

heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

V. nonane diol isomers including: 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VI. glyceryl ethers and/or di(hydroxyalkyl)ethers including: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-; 1,3-propanediol, 2-phenyloxy-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, -benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; 1,3-propanediol, 2-(1-phenylethyloxy)-; bis(2-hydroxybutyl)ether; and/or bis(2-hydroxycyclopentyl)ether

VII. saturated and unsaturated alicyclic diols and their derivatives including:

(a) the saturated diols and their derivatives, including:

1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-methyl-1,2-cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; ; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxylate; 1,2-cyclohexanediol, dibutylenoxylate; and/or 1,2-cyclohexanediol, tributylenoxylate; and

(b). the unsaturated alicyclic diols including: 1,2-cyclobutanediol, 1-ethenyl-2-ethyl-; 3-cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-; 3-cyclobutene-1,2-diol, 3,4-diethyl-; 3-cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-; 3-cyclobutene-1,2-diol, 3-butyl-; 1,2-cyclopentanediol, 1,2-dimethyl-4-methylene-; 1,2-cyclopentanediol, 1-ethyl-3-methylene-; 1,2-cyclopentanediol, 4-(1-propenyl); 3-cyclopentene-1,2-diol, 1-ethyl-3-methyl-; 1,2-cyclohexanediol, 1-ethenyl-; 1,2-cyclohexanediol, 1-methyl-3-methylene-; 1,2-cyclohexanediol, 1-methyl-4-methylene-; 1,2-cyclohexanediol, 3-ethenyl-; 1,2-cyclohexanediol, 4-ethenyl-; 3-cyclohexene-1,2-diol, 2,6-dimethyl-; 3-cyclohexene-1,2-diol, 6,6-dimethyl-; 4-cyclohexene-1,2-diol, 3,6-dimethyl-; 4-cyclohexene-1,2-diol, 4,5-dimethyl-; 3-cyclooctene-1,2-diol; 4-cyclooctene-1,2-diol; and/or 5-cyclooctene-1,2-diol;

VIII. Alkoxyated derivatives of C₃-8 diols including:

1. 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;
2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7)

(Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-

pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl-

(C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol

(C7) n-BO₁₋₂, 1,5-heptanediol (C7) E₁₋₇, 1,5-heptanediol (C7) PO₁, 1,5-heptanediol (C7) n-BO₁₋₂, 1,6-heptanediol (C7) E₁₋₇, 1,6-heptanediol (C7) PO₁, 1,6-heptanediol (C7) n-BO₁₋₂, 1,7-heptanediol (C7) E₁₋₂, 1,7-heptanediol (C7) n-BO₁, 2,4-heptanediol (C7) E₃₋₁₀, 2,4-heptanediol (C7) (Me-E₁), 2,4-heptanediol (C7) PO₁, 2,4-heptanediol (C7) n-BO₃, 2,5-heptanediol (C7) E₃₋₁₀, 2,5-heptanediol (C7) (Me-E₁), 2,5-heptanediol (C7) PO₁, 2,5-heptanediol (C7) n-BO₃, 2,6-heptanediol (C7) E₃₋₁₀, 2,6-heptanediol (C7) (Me-E₁), 2,6-heptanediol (C7) PO₁, 2,6-heptanediol (C7) n-BO₃, 3,5-heptanediol (C7) E₃₋₁₀, 3,5-heptanediol (C7) (Me-E₁), 3,5-heptanediol (C7) PO₁, 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁, 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁, 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅, 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅, 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅, 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅, 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅, 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅, 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅, 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅, 3,5-heptanediol, 3-methyl- (C8) E₂₋₅, 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂, 2,4-hexanediol, 5,5-dimethyl- (C8) n-BO₁₋₂, 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂, 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂, 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂, 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂, 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂, 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂, 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁, 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁, 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁, 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁, 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁, 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁, 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁, 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁, 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁, 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁, 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁, 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁, 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁, 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁, 2,4-hexanediol, 4-ethyl- (C8) n-BO₁, 2,4-heptanediol, 2-methyl- (C8) n-BO₁, 2,4-heptanediol, 3-methyl- (C8) n-BO₁, 2,4-heptanediol, 4-methyl- (C8) n-BO₁, 2,4-heptanediol, 5-methyl- (C8) n-BO₁, 2,4-heptanediol, 6-methyl- (C8) n-BO₁, 2,5-heptanediol, 2-methyl- (C8) n-BO₁, 2,5-

heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof;

IX. aromatic diols including: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; and/or 1-phenyl-2,3-butanediol;

X. solvents which have a ClogP value of from about 0.15 to about 0.64 and are homologs, or analogs, of the above structures where one, or more, CH₂ groups are added while, for each CH₂ group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen atoms in the molecule constant, including the following:

1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 2,2-di-2-propenyl-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-; 1,3-Propanediol, 2-(4-pentenyl)-; 1,3-Propanediol, 2-ethyl-2-(3-methyl-3-butenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-Butanediol, 2,2-diallyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-Butanediol, 2,3-bis(1-methylethylidene)-; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2-Butene-

1,4-diol, 2-(1,1-dimethylpropyl)-, 2-Butene-1,4-diol, 2-(1-methylpropyl)-, 2-Butene-1,4-diol, 2-butyl-, 1,3-Pentanediol, 2-ethenyl-3-ethyl-, 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-, 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-, 1,5-Pentanediol, 2-(1-propenyl)-, 1,5-Pentanediol, 2-(2-propenyl)-, 1,5-Pentanediol, 2-ethylidene-3-methyl-, 1,5-Pentanediol, 2-propylidene-, 2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-, 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-, 4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-, 1,4-Hexanediol, 4-ethyl-2-methylene-, 1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-, 1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-, 1,5-Hexanediol, 2-(1-methylethenyl)-, 1,6-Hexanediol, 2-ethenyl-, 1-Hexene-3,4-diol, 5,5-dimethyl-, 1-Hexene-3,4-diol, 5,5-dimethyl-, 2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-, 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-, 3-Hexene-1,6-diol, 2-ethyl-, 3-Hexene-1,6-diol, 3,4-dimethyl-, 4-Hexene-2,3-diol, 2,5-dimethyl-, 4-Hexene-2,3-diol, 3,4-dimethyl-, 5-Hexene-1,3-diol, 3-(2-propenyl)-, 5-Hexene-2,3-diol, 2,3-dimethyl-, 5-Hexene-2,3-diol, 3,4-dimethyl-, 5-Hexene-2,3-diol, 3,5-dimethyl-, 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-, 1,4-Heptanediol, 6-methyl-5-methylene-, 1,5-Heptadiene-3,4-diol, 2,3-dimethyl-, 1,5-Heptadiene-3,4-diol, 2,5-dimethyl-, 1,5-Heptadiene-3,4-diol, 3,5-dimethyl-, 1,7-Heptanediol, 2,6-bis(methylene)-, 1,7-Heptanediol, 4-methylene-, 1-Heptene-3,5-diol, 2,4-dimethyl-, 1-Heptene-3,5-diol, 2,6-dimethyl-, 1-Heptene-3,5-diol, 3-ethenyl-5-methyl-, 1-Heptene-3,5-diol, 6,6-dimethyl-, 2,4-Heptadiene-2,6-diol, 4,6-dimethyl-, 2,5-Heptadiene-1,7-diol, 4,4-dimethyl-, 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-, 2-Heptene-1,4-diol, 5,6-dimethyl-, 2-Heptene-1,5-diol, 5-ethyl-, 2-Heptene-1,7-diol, 2-methyl-, 3-Heptene-1,5-diol, 4,6-dimethyl-, 3-Heptene-1,7-diol, 3-methyl-6-methylene-, 3-Heptene-2,5-diol, 2,4-dimethyl-, 3-Heptene-2,5-diol, 2,5-dimethyl-, 3-Heptene-2,6-diol, 2,6-dimethyl-, 3-Heptene-2,6-diol, 4,6-dimethyl-, 5-Heptene-1,3-diol, 2,4-dimethyl-, 5-Heptene-1,3-diol, 3,6-dimethyl-, 5-Heptene-1,4-diol, 2,6-dimethyl-, 5-Heptene-1,4-diol, 3,6-dimethyl-, 5-Heptene-2,4-diol, 2,3-dimethyl-, 6-Heptene-1,3-diol, 2,2-dimethyl-, 6-Heptene-1,4-diol, 4-(2-propenyl)-, 6-Heptene-1,4-diol, 5,6-dimethyl-, 6-Heptene-1,5-diol, 2,4-dimethyl-, 6-Heptene-1,5-diol, 2-ethylidene-6-methyl-, 6-Heptene-2,4-diol, 4-(2-propenyl)-, 6-Heptene-2,4-diol, 5,5-dimethyl-, 6-Heptene-2,5-diol, 4,6-dimethyl-, 6-Heptene-2,5-diol, 5-ethenyl-4-methyl-, 1,3-Octanediol, 2-methylene-, 1,6-Octadiene-3,5-diol, 2,6-dimethyl-, 1,6-Octadiene-3,5-diol, 3,7-dimethyl-, 1,7-Octadiene-3,6-diol, 2,6-dimethyl-, 1,7-Octadiene-3,6-diol, 2,7-dimethyl-, 1,7-Octadiene-3,6-diol, 3,6-dimethyl-, 1-Octene-3,6-diol, 3-ethenyl-, 2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-, 2,4-Octadiene-1,7-diol, 3,7-dimethyl-, 2,5-Octadiene-1,7-diol, 2,6-dimethyl-, 2,5-Octadiene-1,7-diol, 3,7-dimethyl-, 2,6-Octadiene-1,4-diol, 3,7-dimethyl-, (Rosiridol); 2,6-Octadiene-1,8-diol, 2-methyl-, 2,7-Octadiene-1,4-diol, 3,7-dimethyl-, 2,7-Octadiene-1,5-diol, 2,6-dimethyl-, 2,7-Octadiene-1,6-diol, 2,6-dimethyl-, (8-Hydroxylinalool); 2,7-Octadiene-1,6-diol, 2,7-dimethyl-, 2-Octene-1,4-diol, 2-Octene-

1,7-diol; 2-Octene-1,7-diol, 2-methyl-6-methylene-; 3,5-Octadiene-1,7-diol, 3,7-dimethyl-; 3,5-Octadiene-2,7-diol, 2,7-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3-Octene-1,5-diol, 5-methyl-; 4,6-Octadiene-1,3-diol, 2,2-dimethyl-; 4,7-Octadiene-2,3-diol, 2,6-dimethyl-; 4,7-Octadiene-2,6-diol, 2,6-dimethyl-; 4-Octene-1,6-diol, 7-methyl-; 2,7-bis(methylene)-; 2-methylene-; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 5,7-Octadiene-1,4-diol, 7-methyl-; 5-Octene-1,3-diol; 6-Octene-1,3-diol, 7-methyl-; 6-Octene-1,4-diol, 7-methyl-; 6-Octene-1,5-diol; 6-Octene-1,5-diol, 7-methyl-; 6-Octene-3,5-diol, 2-methyl-; 6-Octene-3,5-diol, 4-methyl-; 7-Octene-1,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 7-Octene-1,3-diol, 7-methyl-; 7-Octene-1,5-diol; 7-Octene-1,6-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-2,4-diol, 2-methyl-6-methylene-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-3,5-diol, 2-methyl-; 1-Nonene-3,5-diol; 1-Nonene-3,7-diol; 3-Nonene-2,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 4-Nonene-2,8-diol; 6,8-Nonadiene-1,5-diol; 7-Nonene-2,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,5-diol; 1,9-Decadiene-3,8-diol; and/or 1,9-Decadiene-4,6-diol; and

XI. mixtures thereof, said principal solvent containing insufficient amounts of solvents selected from the group consisting of: 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethylhexyl-1,3-diol, to provide an aqueous stable product.

10. Fabric softening composition in the form of a stable aqueous dispersion comprising from about 4% to about 50%, preferably from about 10% to about 40%, and more preferably from about 15% to about 30%, of the fabric softener active of any of Claims 1-4.

11. Premix composition comprising the fabric softener active of any of Claims 1-4 and an effective amount of perfume.

12. Premix composition comprising components A., B., and C. of the composition of any of Claims 5-9.

13. Solid fabric softener composition comprising an effective amount of the fabric softener active of any of Claims 1-4.

14. Clear aqueous fabric softener composition comprising an effective amount of the fabric softener active of Claim 1.

15. The process of making a fabric softener composition comprising adding the premix of Claim 12 to water, adjusting the pH to from about 1.5 to about 5, and adding an effective amount to improve viscosity and/or clarity of the composition, of water soluble calcium and/or magnesium salt.

INTERNATIONAL SEARCH REPORT

International Application No.
PC/JS 97/03374

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C11D1/62 C11D1/645 C11D3/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 500 138 A (BACON DENNIS R. ET AL.) 19 March 1996 see column 2, line 55 - column 4, line 34 see column 6, line 40 - column 7, line 17 see column 15, line 48 - line 62 ---	1-6,9, 13,14
X	EP 0 637 625 A (THE PROCTER & GAMBLE CO.) 8 February 1995 see page 3, line 30 - page 5, line 5 see claims 1-4 ---	1-4,14
A	WO 94 20597 A (THE PROCTER & GAMBLE CO.) 15 September 1994 see page 5, line 5 - page 6, line 4 see claims --- -/--	1,2,5,9, 13,14

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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<p>(21) International Application Number: PCT/US96/11556</p> <p>(22) International Filing Date: 11 July 1996 (11.07.96)</p> <p>(30) Priority Data:</p> <table style="width: 100%;"> <tr> <td style="width: 30%;">60/001,057</td> <td style="width: 40%;">11 July 1995 (11.07.95)</td> <td style="width: 30%;">US</td> </tr> <tr> <td>08/621,019</td> <td>22 March 1996 (22.03.96)</td> <td>US</td> </tr> </table> <p>(60) Parent Applications or Grants</p> <p>(63) Related by Continuation</p> <table style="width: 100%;"> <tr> <td style="width: 30%;">US</td> <td style="width: 40%;">08/621,019 (CIP)</td> <td style="width: 30%;"></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,627 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,513 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/621,285 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/621,299 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/621,298 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,626 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,625 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,772 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,281 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,514 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,958 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> <tr> <td>US</td> <td>08/620,767 (CIP)</td> <td></td> </tr> <tr> <td>Filed on</td> <td>22 March 1996 (22.03.96)</td> <td></td> </tr> </table> <p>(71) Applicant (for all designated States except US): THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).</p>	60/001,057	11 July 1995 (11.07.95)	US	08/621,019	22 March 1996 (22.03.96)	US	US	08/621,019 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,627 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,513 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/621,285 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/621,299 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/621,298 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,626 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,625 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,772 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,281 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,514 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,958 (CIP)		Filed on	22 March 1996 (22.03.96)		US	08/620,767 (CIP)		Filed on	22 March 1996 (22.03.96)		<p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): TRINH, Toan [US/US]; 8671 Creekwood Lane, Maineville, OH 45039 (US). 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<p>(54) Title: CONCENTRATED, STABLE FABRIC SOFTENING COMPOSITION</p> <p>(57) Abstract</p> <p>Principal solvents, especially mono-ol and diol principal solvents, having a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, are disclosed that have the ability to make clear aqueous fabric softener compositions containing relatively high concentrations of fabric softener actives having ester linkages in their long, hydrophobic chains. The fabric softener actives are either unsaturated, or have intermediate length chains (~C₁₂₋₁₄) and the said principal solvents are used at levels of less than about 40 %. Other solvents may be present. Some of the said principal solvents are novel compounds and/or novel mixtures. Premixes of the fabric softening actives, the principal solvents, and, optionally, other solvents are useful in the preparation of complete formulations by obviating/limiting the need for heating.</p>																																																																																					

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Concentrated, stable fabric softening composition

This is a continuation-in-part of our thirteen copending United States Patent Applications: 08/621,019; 08/620,627; 08/620,767; 08/620,513; 08/621,285; 08/621,299; 08/621,298; 08/620,626; 08/620,625; 08/620,772; 08/621,281; 08/620,514; and 08/620,958, all filed March 22, 1996 and all having the title "CONCENTRATED, STABLE, PREFERABLY CLEAR, FABRIC SOFTENING COMPOSITION."

TECHNICAL FIELD

The present invention relates to preferably translucent, or, more preferably, clear, aqueous, concentrated, liquid softening compositions useful for softening cloth. It especially relates to textile softening compositions for use in the rinse cycle of a textile laundering operation to provide excellent fabric-softening/static-control benefits, the compositions being characterized by, e.g., reduced staining of fabric, excellent water dispersibility, rewettability, and/or storage and viscosity stability at sub-normal temperatures, i.e., temperatures below normal room temperature, e.g., 25°C.

BACKGROUND OF THE INVENTION

The art discloses problems associated with formulating and preparing clear, concentrated fabric conditioning formulations. For example, European Patent Application No. 404,471, Machin et al., published Dec. 27, 1990, teaches isotropic liquid softening compositions with at least 20% by weight softener and at least 5% by weight of a short chain organic acid.

Fabric softening compositions containing high solvent levels are known in the art. However, softener agglomerates can form and can deposit on clothes which can result in staining and reduced softening performance. Also, compositions may thicken and/or precipitate at lower temperatures, i.e., at about 40°F (about 4°C) to about 65°F (about 18°C). These compositions can also be costly for the consumer due to the high solvent levels associated with making a concentrated, clear product.

The present invention provides concentrated aqueous liquid textile treatment compositions with low organic solvent level (i.e., below about 40%, by weight of the composition), that have improved stability (i.e., remain clear or translucent and do not precipitate, gel, thicken, or solidify) at normal, i.e., room temperatures and sub-normal temperatures under prolonged storage conditions. Said compositions also provide reduced staining of fabrics, good cold water dispersibility, together with

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excellent softening, anti-static and fabric rewettability characteristics, as well as reduced dispenser residue buildup and excellent freeze-thaw recovery.

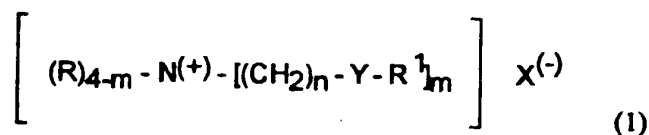
The object of the present invention is to provide aqueous, concentrated, translucent, or, preferably, clear, rinse-added liquid fabric softening compositions which provide one, or more benefits such as reduced staining on fabrics, ready dispersibility in rinse water, phase stability at low temperatures, and/or, preferably acceptable viscosity and viscosity stability at low temperatures, and/or recovery from freezing.

SUMMARY OF THE INVENTION

The compositions herein comprise:

A. from about 2% to about 80%, preferably from about 13% to about 75%, more preferably from about 17% to about 70%, and even more preferably from about 19% to about 65%, by weight of the composition, of biodegradable fabric softener active selected from the group consisting of:

1. softener having the formula:



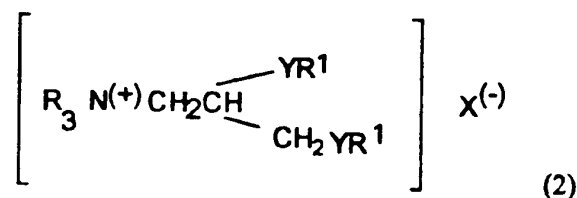
wherein each R substituent is H or a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, preferably -O-(O)C-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C- (hereinafter, R¹ and YR¹, the "YR¹ sum" are used interchangeably to represent the hydrophobic chain, the R¹ chain lengths in general being even numbered for fatty alcohols and amines and odd for fatty acids), is C₆-C₂₂, preferably C₁₄-C₂₀, but no more than one YR¹ sum being less than about 12 and then the other YR¹ sum is at least about 16, with each R¹ being a long chain C₆-C₂₂ (or C₅-C₂₁) hydrocarbyl, or substituted hydrocarbyl substituent, preferably C₁₀-C₂₀ (or C₉-C₁₉) alkyl or alkenyl (unsaturated alkyl, including polyunsaturated alkyl, also referred to sometimes as "alkylene"), most preferably C₁₂-C₁₈ (or C₁₁-C₁₇) alkyl or alkenyl, and where, when said sum of carbons is C₁₆-C₁₈ and R¹ is a straight chain group, the Iodine Value (hereinafter referred to as IV) of the parent fatty acid of this R¹ group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115 (As used

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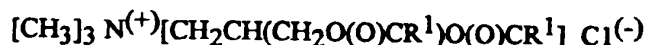
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herein, the Iodine Value of a "parent" fatty acid, or "corresponding" fatty acid, is used to define a level of unsaturation for an R^1 group that is the same as the level of unsaturation that would be present in a fatty acid containing the same R^1 group.); and wherein the counterion, X^- , can be any softener-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, more preferably chloride;

2. softener having the formula:



wherein each Y, R, R^1 , and $X^{(-)}$ have the same meanings as before (Such compounds include those having the formula:



where $C(O)R^1$ is derived from unsaturated, e.g., oleic, fatty acid and, preferably, each R is a methyl or ethyl group and preferably each R^1 is in the range of C_{15} to C_{19} with degrees of branching and substitution optionally being present in the alkyl chains); and

3. mixtures thereof;

[In one preferred biodegradable quaternary ammonium fabric softening compound, $-(O)CR^1$ is derived from unsaturated fatty acid, e.g., oleic acid, and/or fatty acids and/or partially hydrogenated fatty acids, derived from vegetable oils and/or partially hydrogenated vegetable oils, such as: canola oil; safflower oil; peanut oil; sunflower oil; soybean oil; corn oil; tall oil; rice bran oil; etc. and in another preferred biodegradable quaternary ammonium fabric softening compound, $-(O)CR^1$ is a saturated, (the Iodine Value is preferably 10 or less, more preferably less than about 5), C_8 - C_{14} , preferably a C_{12-14} hydrocarbyl, or substituted hydrocarbyl substituent derived from, e.g., coconut oil.] [As used hereinafter, these biodegradable fabric softener actives containing ester linkages are referred to as "DEQA", which includes both diester, triester, and monoester compounds containing from one to three, preferably two, long chain hydrophobic groups. The corresponding amide softener actives and the mixed ester-amide softener actives can also contain from one to three, preferably two, long chain hydrophobic groups. Preferred fabric softener actives

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have the characteristic that they can be processed by conventional mixing means at ambient temperature, at least in the presence of about 15% of solvent C. as disclosed hereinafter.]

B. less than about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, by weight of the composition of principal solvent having a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, said principal solvent containing insufficient amounts of solvents selected from the group consisting of: 2,2,4-trimethyl-1,3-pentanediol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentanediol; and/or 2-ethyl-1,3-hexanediol, and/or mixtures thereof, when used by themselves, to provide a clear product, preferably insufficient to provide a stable product, more preferably insufficient to provide a detectable change in the physical characteristics of the composition, and especially completely free thereof, and the principal solvent preferably being selected from the group consisting of:

- I. mono-ols including:
 - a. n-propanol; and/or
 - b. 2-butanol and/or 2-methyl-2-propanol;
- II. hexane diol isomers including: 2,3-butanediol, 2,3-dimethyl-; 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and/or 1,2-hexanediol;
- III. heptane diol isomers including: 1,3-propanediol, 2-butyl-; 1,3-propanediol, 2,2-diethyl-; 1,3-propanediol, 2-(1-methylpropyl)-; 1,3-propanediol, 2-(2-methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; and/or 1,6-heptanediol;

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IV. octane diol isomers including: 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-

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hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

V. nonane diol isomers including: 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VI. glyceryl ethers and/or di(hydroxyalkyl)ethers including: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amtyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-

propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-; 1,3-propanediol, 2-phenyloxy-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, -benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; 1,3-propanediol, 2-(1-phenylethyloxy)-; bis(2-hydroxybutyl)ether; and/or bis(2-hydroxycyclopentyl)ether;

VII. saturated and unsaturated alicyclic diols and their derivatives including:

(a) the saturated diols and their derivatives, including:

1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 2-hydroxymethylcyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-

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cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; ; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxylate; 1,2-cyclohexanediol, dibutylenoxylate; and/or 1,2-cyclohexanediol, tributelenoxylate; and

(b). the unsaturated alicyclic diols including: 1,2-cyclobutanediol, 1-ethenyl-2-ethyl-; 3-cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-; 3-cyclobutene-1,2-diol, 3,4-diethyl-; 3-cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-; 3-cyclobutene-1,2-diol, 3-butyl-; 1,2-cyclopentanediol, 1,2-dimethyl-4-methylene-; 1,2-cyclopentanediol, 1-ethyl-3-methylene-; 1,2-cyclopentanediol, 4-(1-propenyl); 3-cyclopentene-1,2-diol, 1-ethyl-3-methyl-; 1,2-cyclohexanediol, 1-ethenyl-; 1,2-cyclohexanediol, 1-methyl-3-methylene-; 1,2-cyclohexanediol, 1-methyl-4-methylene-; 1,2-cyclohexanediol, 3-ethenyl-; 1,2-cyclohexanediol, 4-ethenyl-; 3-cyclohexene-1,2-diol, 2,6-dimethyl-; 3-cyclohexene-1,2-diol, 6,6-dimethyl-; 4-cyclohexene-1,2-diol, 3,6-dimethyl-; 4-cyclohexene-1,2-diol, 4,5-dimethyl-; 3-cyclooctene-1,2-diol; 4-cyclooctene-1,2-diol; and/or 5-cyclooctene-1,2-diol;

VIII. Alkoxyated derivatives of C₃₋₈ diols [In the following disclosure, "EO" means polyethoxylates, i.e., $-(CH_2CH_2O)_nH$; Me-E_n means methyl-capped polyethoxylates $-(CH_2CH_2O)_nCH_3$; "2(Me-En)" means 2 Me-En groups needed; "PO" means polypropoxylates, $-(CH(CH_3)CH_2O)_nH$; "BO" means polybutyleneoxy groups, $(CH(CH_2CH_3)CH_2O)_nH$; and "n-BO" means poly(n-butyleneoxy) or poly(tetramethylene)oxy groups $-(CH_2CH_2CH_2CH_2O)_nH$. The use of the term "(C_x)" herein refers to the number of carbon atoms in the base material which is alkoxyated.] including:

- 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me-E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7)

E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol,

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2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-



pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄;
 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃;
 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-
 pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-
 pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄;
 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7)
 PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl-
 (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-
 dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-
 pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-
 pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁;
 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7)
 (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl-
 (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-
 methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-
 methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol,
 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-
 E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-
 pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂;
 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁;
 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7)
 E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7)
 n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂;
 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂;
 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁;
 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-
 E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-
 pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-
 methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-
 methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl-
 (C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl-
 (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-
 E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄);
 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-
 E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7)
 (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl-

(C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-

methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof;

IX. aromatic diols including: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; and/or 1-phenyl-2,3-butanediol;

X. principal solvents which are homologs, or analogs, of the above structures where one, or more, CH₂ groups are added while, for each CH₂ group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen atoms in the molecule constant, including the following:

1,3-Propanediol, 2,2-di-2-propenyl-; 1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 1,3-Propanediol, 2-(4-pentenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Propanediol, 2-methyl-2-

(3-methyl-3-butenyl)-; 1,3-Butanediol, 2,2-diallyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-Butanediol, 2-(2-butenyl)-2-methyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-Butanediol, 2,3-bis(1-methylethylidene)-; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-; 2-Butene-1,4-diol, 2-(1-methylpropyl)-; 2-Butene-1,4-diol, 2-butyl-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-; 1,5-Pentanediol, 2-(1-propenyl)-; 1,5-Pentanediol, 2-(2-propenyl)-; 1,5-Pentanediol, 2-ethylidene-3-methyl-; 1,5-Pentanediol, 2-propylidene-; 2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-Hexanediol, 4-ethyl-2-methylene-; 1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; 1,6-Hexanediol, 2-ethenyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-1,3-diol, 3-(2-propenyl)-; 5-Hexene-2,3-diol, 2,3-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,5-dimethyl-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 1,5-Heptadiene-3,4-diol, 2,3-dimethyl-; 1,5-Heptadiene-3,4-diol, 2,5-dimethyl-; 1,5-Heptadiene-3,4-diol, 3,5-dimethyl-; 1,7-Heptanediol, 2,6-bis(methylene)-; 1,7-Heptanediol, 4-methylene-; 1-Heptene-3,5-diol, 2,4-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 3-ethenyl-5-methyl-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 2,4-Heptadiene-2,6-diol, 4,6-dimethyl-; 2,5-Heptadiene-1,7-diol, 4,4-dimethyl-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,5-diol, 5-ethyl-; 2-Heptene-1,7-diol, 2-methyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 3-Heptene-1,7-diol, 3-methyl-6-methylene-; 3-Heptene-2,5-diol, 2,4-dimethyl-; 3-Heptene-2,5-diol, 2,5-dimethyl-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 3-Heptene-2,6-diol, 4,6-dimethyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 5-Heptene-1,3-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 5-Heptene-1,4-diol, 3,6-dimethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 6-Heptene-1,4-diol, 4-(2-propenyl)-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,5-diol, 2,4-dimethyl-; 6-Heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 6-Heptene-2,5-diol, 5-ethenyl-4-methyl-; 1,3-Octanediol, 2-methylene-; 1,6-Octadiene-3,5-diol, 2,6-dimethyl-; 1,6-Octadiene-3,5-diol, 3,7-dimethyl-; 1,7-Octadiene-3,6-diol, 2,6-dimethyl-; 1,7-

Octadiene-3,6-diol, 2,7-dimethyl-; 1,7-Octadiene-3,6-diol, 3,6-dimethyl-; 1-Octene-3,6-diol, 3-ethenyl-; 2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-; 2,4-Octadiene-1,7-diol, 3,7-dimethyl-; 2,5-Octadiene-1,7-diol, 2,6-dimethyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-Octadiene-1,8-diol, 2-methyl-; 2,7-Octadiene-1,4-diol, 3,7-dimethyl-; 2,7-Octadiene-1,5-diol, 2,6-dimethyl-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool); 2,7-Octadiene-1,6-diol, 2,7-dimethyl-; 2-Octene-1,4-diol; 2-Octene-1,7-diol; 2-Octene-1,7-diol, 2-methyl-6-methylene-; 3,5-Octadiene-1,7-diol, 3,7-dimethyl-; 3,5-Octadiene-2,7-diol, 2,7-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3-Octene-1,5-diol, 5-methyl-; 4,6-Octadiene-1,3-diol, 2,2-dimethyl-; 4,7-Octadiene-2,3-diol, 2,6-dimethyl-; 4,7-Octadiene-2,6-diol, 2,6-dimethyl-; 4-Octene-1,6-diol, 7-methyl-; 2,7-bis(methylene)-; 2-methylene-; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 5,7-Octadiene-1,4-diol, 7-methyl-; 5-Octene-1,3-diol; 6-Octene-1,3-diol, 7-methyl-; 6-Octene-1,4-diol, 7-methyl-; 6-Octene-1,5-diol; 6-Octene-1,5-diol, 7-methyl-; 6-Octene-3,5-diol, 2-methyl-; 6-Octene-3,5-diol, 4-methyl-; 7-Octene-1,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 7-Octene-1,3-diol, 7-methyl-; 7-Octene-1,5-diol; 7-Octene-1,6-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-2,4-diol, 2-methyl-6-methylene-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-3,5-diol, 2-methyl-; 1-Nonene-3,5-diol; 1-Nonene-3,7-diol; 3-Nonene-2,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 4-Nonene-2,8-diol; 6,8-Nonadiene-1,5-diol; 7-Nonene-2,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,5-diol; 1,9-Decadiene-3,8-diol; and/or 1,9-Decadiene-4,6-diol; and

XI. mixtures thereof;

C. optionally, but preferably, an effective amount, sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate, etc., said water soluble solvents being at a level that will not form clear compositions by themselves;

D. optionally, but preferably, an effective amount to improve clarity, of water soluble calcium and/or magnesium salt, preferably chloride; and

E. the balance being water.

Preferably, when the fabric softener active is one in which R is hydrogen, or hydroxy alkyl, and especially when the Y group is an amido group, the solvent is not a mono-ol, especially t-butanol, or 2-methyl-pentanediol.

Preferably, the compositions herein are aqueous, translucent or clear, preferably clear, compositions containing from about 3% to about 95%, preferably from about 5% to about 80%, more preferably from about 15% to about 70%, and

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even more preferably from about 40% to about 60%, water and from about 3% to about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, of the above principal alcohol solvent B. These preferred products (compositions) are not translucent or clear without principal solvent B. The amount of principal solvent B. required to make the compositions translucent or clear is preferably more than 50%, more preferably more than about 60%, and even more preferably more than about 75%, of the total organic solvent present.

The principal solvents are desirably kept to the lowest levels that provide acceptable stability/clarity in the present compositions. The presence of water exerts an important effect on the need for the principal solvents to achieve clarity of these compositions. The higher the water content, the higher the principal solvent level (relative to the softener level) is needed to attain product clarity. Inversely, the less the water content, the less principal solvent (relative to the softener) is needed. Thus, at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is preferably from about 55:45 to about 85:15, more preferably from about 60:40 to about 80:20. At water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is preferably from about 45:55 to about 70:30, more preferably from about 55:45 to about 70:30. But at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is preferably from about 30:70 to about 55:45, more preferably from about 35:65 to about 45:55. At higher water levels, the softener to principal solvent ratios should be even higher.

Some of the above solvents are new compounds and/or mixtures of compounds, as discussed hereinafter.

The pH of the compositions should be from about 1 to about 7, preferably from about 1.5 to about 5, more preferably from about 2 to about 3.5.

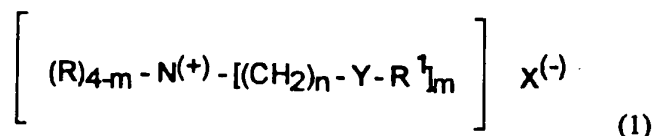
DETAILED DESCRIPTION OF THE INVENTION

I. FABRIC SOFTENING ACTIVE

The present invention contains as an essential component from about 2% to about 80%, preferably from about 13% to about 75%, more preferably from about 17% to about 70%, and even more preferably from about 19% to about 65% by weight of the composition, of a fabric softener active selected from the compounds identified hereinafter, and mixtures thereof.

(A) Diester Quaternary Ammonium Fabric Softening Active Compound (DEOA)

(1) The first type of DEQA preferably comprises, as the principal active, compounds of the formula



wherein: each R substituent is H or a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, preferably -O(O)C-, but not -OC(O)O-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -(R)N-(O)C-, is C₆-C₂₂, preferably C₁₄-C₂₀, but no more than one YR¹ sum being less than about 12 and then the other YR¹ sum is at least about 16, with each R¹ being a long chain C₈-C₂₂ (or C₇-C₂₁) hydrocarbyl, or substituted hydrocarbyl substituent, preferably C₁₀-C₂₀ (or C₉-C₁₉) alkyl or alkenyl, most preferably C₁₂-C₁₈ (or C₁₁-C₁₇) alkyl or alkenyl, and where, when said sum of carbons is C₁₆-C₁₈ and R¹ is a straight chain alkyl or alkenyl group, the Iodine Value (hereinafter referred to as IV) of the parent fatty acid of this R¹ group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115. (As used herein, the Iodine Value of a "parent" fatty acid, or "corresponding" fatty acid, is used to define a level of unsaturation for an R¹ group that is the same as the level of unsaturation that would be present in a fatty acid containing the same R¹ group.)

The counterion, X⁽⁻⁾ above, can be any softener-compatible anion, preferably the anion of a strong acid, for example, chloride, bromide, methylsulfate, ethylsulfate, sulfate, nitrate and the like, more preferably chloride. The anion can also, but less preferably, carry a double charge in which case X⁽⁻⁾ represents half a group.

Preferred biodegradable quaternary ammonium fabric softening compounds can contain the group -(O)CR¹ which is derived from unsaturated, and polyunsaturated, fatty acids, e.g., oleic acid, and/or partially hydrogenated fatty acids, derived from vegetable oils and/or partially hydrogenated vegetable oils, such as, canola oil, safflower oil, peanut oil, sunflower oil, corn oil, soybean oil, tall oil, rice bran oil, etc. Numerous examples of DEQAs prepared from preferred fatty acids have the following approximate distributions:

Fatty Acyl Group

DEQA¹ DEQA² DEQA³ DEQA⁴ DEQA⁵

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C12	trace	trace	0	0	0
C14	3	3	0	0	0
C16	4	4	5	5	5
C18	0	0	5	6	6
C14:1	3	3	0	0	0
C16:1	11	7	0	0	3
C18:1	74	73	71	68	67
C18:2	4	8	8	11	11
C18:3	0	1	1	2	2
C20:1	0	0	2	2	2
C20 and up	0	0	2	0	0
Unknowns	0	0	6	6	7
<i>Total</i>	99	99	100	100	102
IV	86-90	88-95	99	100	95
cis/trans (C18:1)	20-30	20-30	4	5	5
TPU	4	9	10	13	13

Mixtures of fatty acids, and mixtures of DEQAs that are derived from different fatty acids can be used, and are preferred. Nonlimiting examples of DEQA's that can be blended, to form DEQA's of this invention are as follows:

<u>Fatty Acyl Group</u>	<u>DEQA¹⁰</u>	<u>DEQA¹¹</u>
C14	0	1
C16	11	25
C18	4	20
C14:1	0	0
C16:1	1	0
C18:1	27	45
C18:2	50	6
C18:3	7	0
Unknowns	0	3
<i>Total</i>	100	100
IV	125-138	56
cis/trans (C18:1)	Not Available	7
TPU	57	6

DEQA¹⁰ is prepared from a soy bean fatty acid, and DEQA¹¹ is prepared from a slightly hydrogenated tallow fatty acid.

Also optionally, but preferably, R¹ groups can comprise branched chains, e.g., from isostearic acid, for at least part of the R¹ groups. The total of active represented by the branched chain groups, when they are present, is typically from

about 1% to about 90%, preferably from about 10% to about 70%, more preferably from about 20% to about 50%.

<u>Fatty Acyl Group</u>	<u>DEQA¹²</u>	<u>DEQA¹³</u>	<u>DEQA¹⁴</u>
Isomyristic acid	--	1-2	--
Myristic acid	7-11	0.5-1	--
Isopalmitic acid	6-7	6-7	1-3
Palmitic acid	4-5	6-7	--
Isostearic acid	70-76	80-82	60-66
Stearic acid	--	2-3	8-10
Isoleic acid	--	--	13-17
Oleic acid	--	--	6-12
IV	3	2	7-12

DEQA¹² - DEQA¹⁴ are prepared from different commercially available isostearic acids.

The more preferred DEQA's are those that are prepared as a single DEQA from blends of all the different fatty acids that are represented (total fatty acid blend), rather than from blends of mixtures of separate finished DEQA's that are prepared from different portions of the total fatty acid blend.

It is preferred that at least a majority of the fatty acyl groups are unsaturated, e.g., from about 50% to 100%, preferably from about 55% to about 95%, more preferably from about 60% to about 90%, and that the total level of active containing polyunsaturated fatty acyl groups (TPU) be from about 3% to about 30%, preferably from about 5% to about 25%, more preferably from about 10% to about 18%. The cis/trans ratio for the unsaturated fatty acyl groups is usually important, with the cis/trans ratio being from 1:1 to about 50:1, the minimum being 1:1, preferably at least 3:1, and more preferably from about 4:1 to about 20:1. (As used herein, the "percent of softener active" containing a given R¹ group is the same as the percentage of that same R¹ group is to the total R¹ groups used to form all of the softener actives.)

The unsaturated, including the preferred polyunsaturated, fatty acyl groups, discussed hereinbefore and hereinafter, surprisingly provide effective softening, but also provide better rewetting characteristics, good antistatic characteristics, and especially, superior recovery after freezing and thawing.

The highly unsaturated materials are also easier to formulate into concentrated premixes that maintain their low viscosity and are therefore easier to process, e.g., pump, mixing, etc. These highly unsaturated materials with only the low amount of solvent that normally is associated with such materials, i.e., from about 5% to about

20%, preferably from about 8% to about 25%, more preferably from about 10% to about 20%, weight of the total softener/solvent mixture, are also easier to formulate into concentrated, stable compositions of the present invention, even at ambient temperatures. This ability to process the actives at low temperatures is especially important for the polyunsaturated groups, since it minimizes degradation. Additional protection against degradation can be provided when the compounds and softener compositions contain effective antioxidants, chelants, and/or reducing agents, as disclosed hereinafter.

The present invention can contain medium-chain biodegradable quaternary ammonium fabric softening compound, DEQA, as a preferred component, having the above formula (1) and/or formula (2), below, wherein:

each Y is $-O-(O)C-$, $-(R)N-(O)C-$, $-C(O)-N(R)-$, or $-C(O)-O-$, preferably $-O-(O)C-$;

m is 2 or 3, preferably 2;

each n is 1 to 4, preferably 2;

each R substituent is H or a C_1-C_6 alkyl, preferably a methyl, ethyl, propyl, benzyl groups or mixtures thereof, more preferably a C_1-C_3 alkyl group;

each R^1 , or YR^1 hydrophobic group is a saturated, C_8-C_{14} , preferably a $C_{12}-C_{14}$ hydrocarbyl, or substituted hydrocarbyl substituent (the IV is preferably about 10 or less, more preferably less than about 5), [The sum of the carbons in the hydrophobic group is the number of carbon atoms in the R^1 group, or in the YR^1 group when Y is $-O-(O)C-$ or $-(R)N-(O)C-$.] and the counterion, X^- , is the same as above. Preferably X^- does not include phosphate salts.

The saturated C_8-C_{14} fatty acyl groups can be pure derivatives or can be mixed chainlengths.

Suitable fatty acid sources for said fatty acyl groups are coco, lauric, caprylic, and capric acids.

For $C_{12}-C_{14}$ (or $C_{11}-C_{13}$) hydrocarbyl groups, the groups are preferably saturated, e.g., the IV is preferably less than about 10, preferably less than about 5.

It will be understood that substituents R and R^1 can optionally be substituted with various groups such as alkoxyl or hydroxyl groups, and can be straight, or branched so long as the R^1 groups maintain their basically hydrophobic character. The preferred compounds can be considered to be biodegradable diester variations of ditallow dimethyl ammonium chloride (hereinafter referred to as "DTDMAC"), which is a widely used fabric softener.

A preferred long chain DEQA is the DEQA prepared from sources containing high levels of polyunsaturation, i.e., N,N-di(acyl-oxyethyl)-N,N-dimethyl ammonium

chloride, where the acyl is derived from fatty acids containing sufficient polyunsaturation, e.g., mixtures of tallow fatty acids and soybean fatty acids. Another preferred long chain DEQA is the dioleyl (nominally) DEQA, i.e., DEQA in which N,N-di(oleoyl-oxyethyl)-N,N-dimethyl ammonium chloride is the major ingredient. Preferred sources of fatty acids for such DEQAs are vegetable oils, and/or partially hydrogenated vegetable oils, with high contents of unsaturated, e.g., oleoyl groups. Preferred medium chain DEQAs are dicocoyl DEQA (derived from coconut fatty acids), i.e., N,N-di(coco-oyl-oxyethyl)-N,N-dimethyl ammonium chloride, exemplified hereinafter as DEQA⁶, and N,N-di(lauroyl-oxyethyl)-N,N-dimethyl ammonium chloride.

As used herein, when the diester is specified, it can include the monoester that is present. Preferably, at least about 80% of the DEQA is in the diester form, and from 0% to about 20% can be DEQA monoester, e.g., one YR¹ group is either OH, or -C(O)OH, and, for Formula 1., m is 2. The corresponding diamide and/or mixed ester-amide can also include the active with one long chain hydrophobic group, e.g., one YR¹ group is either -N(R)H, or -C(O)OH. In the following, any disclosure, e.g., levels, for the monoester actives is also applicable to the monoamide actives. For softening, under no/low detergent carry-over laundry conditions the percentage of monoester should be as low as possible, preferably no more than about 5%. However, under high, anionic detergent surfactant or detergent builder carry-over conditions, some monoester can be preferred. The overall ratios of diester to monoester are from about 100:1 to about 2:1, preferably from about 50:1 to about 5:1, more preferably from about 13:1 to about 8:1. Under high detergent carry-over conditions, the di/moanoester ratio is preferably about 11:1. The level of monoester present can be controlled in manufacturing the DEQA.

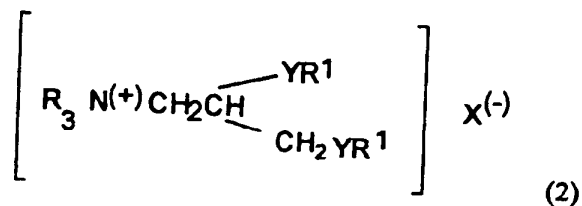
The above compounds, used as the biodegradable quaternized ester-amine softening material in the practice of this invention, can be prepared using standard reaction chemistry. In one synthesis of a di-ester variation of DTDMAC, an amine of the formula $RN(CH_2CH_2OH)_2$ where R is e.g., alkyl, is esterified at both hydroxyl groups with an acid chloride of the formula $R^1C(O)Cl$, to form an amine which can be made cationic by acidification (one R is H) to be one type of softener, or then quaternized with an alkyl halide, RX, to yield the desired reaction product (wherein R and R¹ are as defined hereinbefore). However, it will be appreciated by those skilled in the chemical arts that this reaction sequence allows a broad selection of agents to be prepared.

Yet another DEQA softener active that is suitable for the formulation of the concentrated, clear liquid fabric softener compositions of the present invention has

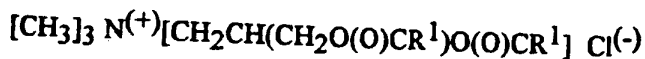
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the above formula (1) wherein one R group is a C₁₋₄ hydroxy alkyl group, preferably one wherein one R group is a hydroxyethyl group. An example of such a hydroxyethyl ester active is di(acyloxyethyl)(2-hydroxyethyl)methyl ammonium methyl sulfate, wherein the acyl group is the same as that of DEQA¹, exemplified hereinafter as DEQA⁸.

(2) The second type of DEQA active has the general formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before. Such compounds include those having the formula:



where each R is a methyl or ethyl group and preferably each R¹ is in the range of C₁₅ to C₁₉. Degrees of branching and substitution can be present in the alkyl or alkenyl chains. The anion X⁽⁻⁾ in the molecule is the same as in DEQA (1) above. As used herein, when the diester is specified, it can include the monoester that is present. The amount of monoester that can be present is the same as in DEQA (1). An example of a preferred DEQA of formula (2) is the "propyl" ester quaternary ammonium fabric softener active having the formula 1,2-di(acyloxy)-3-trimethylammoniopropane chloride, wherein the acyl group is the same as that of DEQA⁵, exemplified hereinafter as DEQA⁹.

These types of agents and general methods of making them are disclosed in U.S. Pat. No. 4,137,180, Naik et al., issued Jan. 30, 1979, which is incorporated herein by reference.

In preferred softener actives (1) and (2), each R¹ is a hydrocarbyl, or substituted hydrocarbyl, group, preferably, alkyl, monounsaturated alkenyl, and polyunsaturated alkenyl groups, with the softener active containing polyunsaturated alkenyl groups being at least about 3%, preferably at least about 5%, more preferably at least about 10%, and even more preferably at least about 15%, by weight of the total softener active present; the actives preferably containing mixtures of R¹ groups, especially within the individual molecules, and also, optionally, but preferably, the saturated R¹ groups comprising branched chains, e.g., from isostearic acid, for at

least part of the saturated R¹ groups, the total of active represented by the branched chain groups preferably being from about 1% to about 90%, preferably from about 10% to about 70%, more preferably from about 20% to about 50%. The DEQAs herein can contain a low level of fatty acid, which can be from unreacted starting material used to form the DEQA and/or as a by-product of any partial degradation (hydrolysis) of the softener active in the finished composition. It is preferred that the level of free fatty acid be low, preferably below about 10%, and more preferably below about 5%, by weight of the softener active.

II. PRINCIPAL SOLVENT SYSTEM

The compositions of the present invention comprise less than about 40%, preferably from about 10% to about 35%, more preferably from about 12% to about 25%, and even more preferably from about 14% to about 20%, of the principal solvent, by weight of the composition. Said principal solvent is selected to minimize solvent odor impact in the composition and to provide a low viscosity to the final composition. For example, isopropyl alcohol is not very effective and has a strong odor. n-Propyl alcohol is more effective, but also has a distinct odor. Several butyl alcohols also have odors but can be used for effective clarity/stability, especially when used as part of a principal solvent system to minimize their odor. The alcohols are also selected for optimum low temperature stability, that is they are able to form compositions that are liquid with acceptable low viscosities and translucent, preferably clear, down to about 40°F (about 4.4°C) and are able to recover after storage down to about 20°F (about 6.7°C).

The suitability of any principal solvent for the formulation of the liquid, concentrated, preferably clear, fabric softener compositions herein with the requisite stability is surprisingly selective. Suitable solvents can be selected based upon their octanol/water partition coefficient (P). Octanol/water partition coefficient of a principal solvent is the ratio between its equilibrium concentration in octanol and in water. The partition coefficients of the principal solvent ingredients of this invention are conveniently given in the form of their logarithm to the base 10, logP.

The logP of many ingredients has been reported; for example, the Pomona92 database, available from Daylight Chemical Information Systems, Inc. (Daylight CIS), Irvine, California, contains many, along with citations to the original literature. However, the logP values are most conveniently calculated by the "CLOGP" program, also available from Daylight CIS. This program also lists experimental logP values when they are available in the Pomona92 database. The "calculated logP" (ClogP) is determined by the fragment approach of Hansch and Leo (cf., A. Leo, in Comprehensive Medicinal Chemistry, Vol. 4, C. Hansch, P. G. Sammens, J.

B. Taylor and C. A. Ramsden, Eds., p. 295, Pergamon Press, 1990, incorporated herein by reference). The fragment approach is based on the chemical structure of each ingredient, and takes into account the numbers and types of atoms, the atom connectivity, and chemical bonding. The ClogP values, which are the most reliable and widely used estimates for this physicochemical property, are preferably used instead of the experimental logP values in the selection of the principal solvent ingredients which are useful in the present invention. Other methods that can be used to compute ClogP include, e.g., Crippen's fragmentation method as disclosed in *J. Chem. Inf. Comput. Sci.*, 27, 21 (1987); Viswanadhan's fragmentation method as disclosed in *J. Chem. Inf. Comput. Sci.*, 29, 163 (1989); and Broto's method as disclosed in *Eur. J. Med. Chem. - Chim. Theor.*, 19, 71 (1984).

The principal solvents herein are selected from those having a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, said principal solvent preferably being asymmetric, and preferably having a melting, or solidification, point that allows it to be liquid at, or near room temperature. Solvents that have a low molecular weight and are biodegradable are also desirable for some purposes. The more asymmetric solvents appear to be very desirable, whereas the highly symmetrical solvents, having a center of symmetry, such as 1,7-heptanediol, or 1,4-bis(hydroxymethyl)cyclohexane, appear to be unable to provide the essentially clear compositions when used alone, even though their ClogP values fall in the preferred range. One can select the most suitable principal solvent by determining whether a composition containing about 27% di(oleyoyloxyethyl)dimethylammonium chloride, about 16-20% of principal solvent, and about 4-6% ethanol remains clear during storage at about 40°F (about 4.4°C) and recovers from being frozen at about 0°F (about -18°C).

The most preferred principal solvents can be identified by the appearance of the freeze-dried dilute treatment compositions used to treat fabrics. These dilute compositions appear to have dispersions of fabric softener that exhibit a more uni-lamellar appearance than conventional fabric softener compositions. The closer to uni-lamellar the appearance, the better the compositions seem to perform. These compositions provide surprisingly good fabric softening as compared to similar compositions prepared in the conventional way with the same fabric softener active. The compositions also inherently provide improved perfume deposition as compared to conventional fabric softening compositions, especially when the perfume is added to the compositions at, or near, room temperature.

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Operable principal solvents are listed below under various listings, e.g., aliphatic and/or alicyclic diols with a given number of carbon atoms; monols; derivatives of glycerine; alkoxylates of diols; and mixtures of all of the above. The preferred principal solvents are in italics and the most preferred principal solvents are in bold type. The reference numbers are the Chemical Abstracts Service Registry numbers (CAS No.) for those compounds that have such a number. Novel compounds have a method identified, described hereinafter, that can be used to prepare the compounds. Some inoperable principal solvents are also listed below for comparison purposes. The inoperable principal solvents, however, can be used in mixtures with operable principal solvents. Operable principal solvents can be used to make concentrated fabric softener compositions that meet the stability/clarity requirements set forth herein.

Many diol principal solvents that have the same chemical formula can exist as many stereoisomers and/or optical isomers. Each isomer is normally assigned with a different CAS No. For examples, different isomers of 4-methyl-2,3-hexanediol are assigned to at least the following CAS Nos: 146452-51-9; 146452-50-8; 146452-49-5; 146452-48-4; 123807-34-1; 123807-33-0; 123807-32-9; and 123807-31-8.

In the following listings, for simplicity, each chemical formula is listed with only one CAS No. This disclosure is only for exemplification and is sufficient to allow the practice of the invention. The disclosure is not limiting. Therefore, it is understood that other isomers with other CAS Nos, and their mixtures, are also included. By the same token, when a CAS No. represents a molecule which contains some particular isotopes, e.g., deuterium, tritium, carbon-13, etc., it is understood that materials which contain naturally distributed isotopes are also included, and vice versa.

TABLE I
MONO-OLS

<i>n</i> -propanol	<u>CAS No.</u> 71-23-8
2-butanol	<u>CAS No.</u> 15892-23-6
2-methyl-2-propanol	75-65-0
<u>Inoperable Is mer</u>	
2-methyl-1-pr panol	78-83-1

TABLE II
C6 DIOLS

<u>Operable Isomers</u>	<u>CAS No.</u>
2,3-butanediol, 2,3-dimethyl-	76-09-5
<i>1,2-butanediol, 2,3-dimethyl-</i>	66553-15-9
<i>1,2-butanediol, 3,3-dimethyl-</i>	59562-82-2
<i>2,3-pentanediol, 2-methyl-</i>	7795-80-4
<i>2,3-pentanediol, 3-methyl-</i>	63521-37-9
<i>2,3-pentanediol, 4-methyl-</i>	7795-79-1
<i>2,3-hexanediol</i>	617-30-1
<i>3,4-hexanediol</i>	922-17-8
1,2-butanediol, 2-ethyl-	66553-16-0
1,2-pentanediol, 2-methyl-	20667-05-4
1,2-pentanediol, 3-methyl-	159623-53-7
1,2-pentanediol, 4-methyl-	72110-08-8
1,2-hexanediol	6920-22-5
<u>Inoperable Isomers</u>	
1,3-propanediol, 2-ethyl-2-methyl-	
1,3-propanediol, 2-isopropyl-	
1,3-propanediol, 2-propyl-	
1,3-butanediol, 2,2-dimethyl-	
1,3-butanediol, 2,3-dimethyl-	
1,3-butanediol, 2-ethyl-	
1,4-butanediol, 2,2-dimethyl-	
1,4-butanediol, 2,3-dimethyl-	
1,4-butanediol, 2-ethyl-	
1,3-pentanediol, 2-methyl-	
1,3-pentanediol, 3-methyl-	
1,3-pentanediol, 4-methyl-	
1,4-pentanediol, 2-methyl-	
1,4-pentanediol, 3-methyl-	
1,4-pentanediol, 4-methyl-	
1,5-pentanediol, 2-methyl-	
1,5-pentanediol, 3-methyl-	
2,4-pentanediol, 2-methyl-	
2,4-pentanediol, 3-methyl-	
1,3-hexanediol	
1,4-hexanediol	
1,5-hexanediol	
1,6-hexanediol	

2,4-hexanediol

2,5-hexanediol

TABLE III
C7 DIOLS

<u>Operable Isomers</u>	<u>CAS No.</u>
1,3-propanediol, 2-butyl-	2612-26-2
1,3-propanediol, 2,2-diethyl-	115-76-4
1,3-propanediol, 2-(1-methylpropyl)-	33673-01-7
1,3-propanediol, 2-(2-methylpropyl)-	26462-20-8
1,3-propanediol, 2-methyl-2-propyl-	78-26-2
1,2-butanediol, 2,3,3-trimethyl-	Method B
1,4-butanediol, 2-ethyl-2-methyl-	76651-98-4
1,4-butanediol, 2-ethyl-3-methyl-	66225-34-1
1,4-butanediol, 2-propyl-	62946-68-3
1,4-butanediol, 2-isopropyl-	39497-66-0
1,5-pentanediol, 2,2-dimethyl-	3121-82-2
1,5-pentanediol, 2,3-dimethyl-	81554-20-3
1,5-pentanediol, 2,4-dimethyl-	2121-69-9
1,5-pentanediol, 3,3-dimethyl-	53120-74-4
2,3-pentanediol, 2,3-dimethyl-	6931-70-0
2,3-pentanediol, 2,4-dimethyl-	66225-53-4
2,3-pentanediol, 3,4-dimethyl-	37164-04-8
2,3-pentanediol, 4,4-dimethyl-	89851-45-6
3,4-pentanediol, 2,3-dimethyl-	Method B
1,5-pentanediol, 2-ethyl-	14189-13-0
1,6-hexanediol, 2-methyl-	25258-92-8
1,6-hexanediol, 3-methyl-	4089-71-8
2,3-hexanediol, 2-methyl-	59215-55-3
2,3-hexanediol, 3-methyl-	139093-40-6
2,3-hexanediol, 4-methyl-	***
2,3-hexanediol, 5-methyl-	Method B
3,4-hexanediol, 2-methyl-	Method B
3,4-hexanediol, 3-methyl-	18938-47-1
1,3-heptanediol	23433-04-7
1,4-heptanediol	40646-07-9
1,5-heptanediol	60096-09-5
1,6-heptanediol	13175-27-4

Preferred Isomers

1,3-propanediol, 2-butyl-	2612-26-2
1,4-butanediol, 2-propyl-	62946-68-3
1,5-pentanediol, 2-ethyl-	14189-13-0
2,3-pentanediol, 2,3-dimethyl-	6931-70-0

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<i>2,3-pentanediol, 2,4-dimethyl-</i>	66225-53-4
<i>2,3-pentanediol, 3,4-dimethyl-</i>	37164-04-8
<i>2,3-pentanediol, 4,4-dimethyl-</i>	89851-45-6
<i>3,4-pentanediol, 2,3-dimethyl-</i>	Method B
<i>1,6-hexanediol, 2-methyl-</i>	25258-92-8
<i>1,6-hexanediol, 3-methyl-</i>	4089-71-8
<i>1,3-heptanediol</i>	23433-04-7
<i>1,4-heptanediol</i>	40646-07-9
<i>1,5-heptanediol</i>	60096-09-5
<i>1,6-heptanediol</i>	13175-27-4

More Preferred Isomers

<i>2,3-pentanediol, 2,3-dimethyl-</i>	6931-70-0
<i>2,3-pentanediol, 2,4-dimethyl-</i>	66225-53-4
<i>2,3-pentanediol, 3,4-dimethyl-</i>	37164-04-8
<i>2,3-pentanediol, 4,4-dimethyl-</i>	89851-45-6
<i>3,4-pentanediol, 2,3-dimethyl-</i>	Method B

Inoperable Isomers

1,3-propanediol, 2-methyl-2-isopropyl-
1,2-butanediol, 2-ethyl-3-methyl-
1,3-butanediol, 2,2,3-trimethyl-
1,3-butanediol, 2-ethyl-2-methyl-
1,3-butanediol, 2-ethyl-3-methyl-
1,3-butanediol, 2-isopropyl-
1,3-butanediol, 2-propyl-
1,4-butanediol, 2,2,3-trimethyl
1,4-butanediol, 3-ethyl-1-methyl-
1,2-pentanediol, 2,3-dimethyl-
1,2-pentanediol, 2,4-dimethyl-
1,2-pentanediol, 3,3-dimethyl-
1,2-pentanediol, 3,4-dimethyl-
1,2-pentanediol, 4,4-dimethyl-
1,2-pentanediol, 2-ethyl-
1,3-pentanediol, 2,2-dimethyl-
1,3-pentanediol, 2,3-dimethyl-
1,3-pentanediol, 2,4-dimethyl-
1,3-pentanediol, 2-ethyl-
1,3-pentanediol, 3,4-dimethyl-
1,3-pentanediol, 1,4,4-dimethyl-
1,4-pentanediol, 2,2-dimethyl-
1,4-pentanediol, 1,2,3-dimethyl-
1,4-pentanediol, 2,4-dimethyl-
1,4-pentanediol, 3,3-dimethyl-

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1,4-pentanediol, 3,4-dimethyl-
 2,4-pentanediol, 2,3-dimethyl-
 2,4-pentanediol, 2,4-dimethyl-
 2,4-pentanediol, 3,3-dimethyl-
 1,2-hexanediol, 2-methyl-
 1,2-hexanediol, 3-methyl-
 1,2-hexanediol, 4-methyl-
 1,2-hexanediol, 5-methyl-
 1,3-hexanediol, 2-methyl-
 1,3-hexanediol, 3-methyl-
 1,3-hexanediol, 4-methyl-
 1,3-hexanediol, 5-methyl-
 1,4-hexanediol, 2-methyl-
 1,4-hexanediol, 3-methyl-
 1,4-hexanediol, 4-methyl-
 1,4-hexanediol, 5-methyl-
 1,5-hexanediol, 2-methyl-
 1,5-hexanediol, 3-methyl-
 1,5-hexanediol, 4-methyl-
 1,5-hexanediol, 5-methyl-
 2,4-hexanediol, 2-methyl-
 2,4-hexanediol, 3-methyl-
 2,4-hexanediol, 4-methyl-
 2,4-hexanediol, 5-methyl-
 2,5-hexanediol, 2-methyl-
 2,5-hexanediol, 3-methyl-
 1,2-heptanediol
 2,3-heptanediol
 2,4-heptanediol
 2,5-heptanediol
 2,6-heptanediol
 3,4-heptanediol
 1,7-heptanediol
 3,5-heptanediol

*** 146452-51-9; 146452-50-8; 146452-49-5; 146452-48-4;
 123807-34-1; 123807-33-0; 123807-32-9; 123807-31-8;
 and mixtures thereof.

TABLE IV
OCTANEDIOL ISOMERS

PROPANEDIOL DERIVATIVES

Chemical Name	CAS No.
<u>Operable Isomers</u>	
1,3-propanediol, 2-(2-methylbutyl)-	87194-40-9
1,3-propanediol, 2-(1,1-dimethylpropyl)-	Method D

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1,3-propanediol, 2-(1,2-dimethylpropyl)-	Method D
1,3-propanediol, 2-(1-ethylpropyl)-	25462-28-6
1,3-propanediol, 2-(1-methylbutyl)-	22131-29-9
1,3-propanediol, 2-(2,2-dimethylpropyl)-	Method D
1,3-propanediol, 2-(3-methylbutyl)-	25462-27-5
1,3-propanediol, 2-butyl-2-methyl-	3121-83-3
1,3-propanediol, 2-ethyl-2-isopropyl-	24765-55-7
1,3-propanediol, 2-ethyl-2-propyl-	25450-88-8
1,3-propanediol, 2-methyl-2-(1-methylpropyl)-	813-60-5
1,3-propanediol, 2-methyl-2-(2-methylpropyl)-	25462-42-4
1,3-propanediol, 2-tertiary-butyl-2-methyl-	25462-45-7

More Preferred Isomers

1,3-propanediol, 2-(1,1-dimethylpropyl)-	Method D
1,3-propanediol, 2-(1,2-dimethylpropyl)-	Method D
1,3-propanediol, 2-(1-ethylpropyl)-	25462-28-6
1,3-propanediol, 2-(2,2-dimethylpropyl)-	Method D
1,3-propanediol, 2-ethyl-2-isopropyl-	24765-55-7
1,3-propanediol, 2-methyl-2-(1-methylpropyl)-	813-60-5
1,3-propanediol, 2-methyl-2-(2-methylpropyl)-	25462-42-4
1,3-propanediol, 2-tertiary-butyl-2-methyl-	25462-45-7

Inoperable Isomers

1,3-propanediol, 2-pentyl-

BUTANEDIOL DERIVATIVES**Operable Isomers**

1,3-butanediol, 2,2-diethyl-	99799-77-6
1,3-butanediol, 2-(1-methylpropyl)-	Method C
1,3-butanediol, 2-butyl-	83988-22-1
1,3-butanediol, 2-ethyl-2,3-dimethyl-	Method D
1,3-butanediol, 2-(1,1-dimethylethyl)-	67271-58-3
1,3-butanediol, 2-(2-methylpropyl)-	Method C
1,3-butanediol, 2-methyl-2-isopropyl-	Method C
1,3-butanediol, 2-methyl-2-propyl-	99799-79-8
1,3-butanediol, 3-methyl-2-isopropyl-	Method C
1,3-butanediol, 1,3-methyl-2-propyl-	Method D
1,4-butanediol, 2,2-diethyl-	Method H
1,4-butanediol, 2-methyl-2-propyl-	Method H
1,4-butanediol, 2-(1-methylpropyl)-	Method H
1,4-butanediol, 2-ethyl-2,3-dimethyl-	Method F
1,4-butanediol, 2-ethyl-3,3-dimethyl-	Method F
1,4-butanediol, 2-(1,1-dimethylethyl)-	36976-70-2

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1,4-butanediol, 2-(2-methylpropyl)-
 1,4-butanediol, 2-methyl-3-propyl-
 1,4-butanediol, 3-methyl-2-isopropyl-

Method F
 90951-76-1
 99799-24-3

Preferred Isomers

1,3-butanediol, 2,2-diethyl-
 1,3-butanediol, 2-(1-methylpropyl)-
 1,3-butanediol, 2-butyl-
 1,3-butanediol, 2-ethyl-2,3-dimethyl-
 1,3-butanediol, 2-(1,1-dimethylethyl)-
 1,3-butanediol, 2-(2-methylpropyl)-
 1,3-butanediol, 2-methyl-2-isopropyl-
 1,3-butanediol, 2-methyl-2-propyl-
 1,3-butanediol, 3-methyl-2-propyl-
 1,4-butanediol, 2,2-diethyl-
 1,4-butanediol, 2-ethyl-2,3-dimethyl-
 1,4-butanediol, 2-ethyl-3,3-dimethyl-
 1,4-butanediol, 2-(1,1-dimethylethyl)-
 1,4-butanediol, 3-methyl-2-isopropyl-

99799-77-6
Method C
 83988-22-1
Method D
 67271-58-3
Method C
Method C
 99799-79-8
Method D
Method H
Method F
Method F
 36976-70-2
 99799-24-3

More Preferred Isomers

1,3-butanediol, 2-(1-methylpropyl)-
 1,3-butanediol, 2-(2-methylpropyl)-
 1,3-butanediol, 2-butyl-
 1,3-butanediol, 2-methyl-2-propyl-
 1,3-butanediol, 3-methyl-2-propyl-
 1,4-butanediol, 2,2-diethyl-
 1,4-butanediol, 2-ethyl-2,3-dimethyl-
 1,4-butanediol, 2-ethyl-3,3-dimethyl-
 1,4-butanediol, 2-(1,1-dimethylethyl)-

Method C
Method C
 83988-22-1
 99799-79-8
Method D
Method H
Method F
Method F
 36976-70-2

Inoperable Isomers

1,4-butanediol, 2-butyl-
 1,2-butanediol, 2-ethyl-3,3-dimethyl-
 1,4-butanediol, 2-methyl-2-isopropyl-
 1,2-butanediol, 3-methyl-2-isopropyl-
 1,4-butanediol, 2,2,3,3-tetramethyl-

TRIMETHYLPENTANEDIOL ISOMERS**Operable Isomers**

1,3-pentanediol, 2,2,3-trimethyl-
 1,3-pentanediol, 2,2,4-trimethyl-

35512-54-0
 144-19-4

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1,3-pentanediol, 2,3,4-trimethyl-	116614-13-2
1,3-pentanediol, 2,4,4-trimethyl-	109387-36-2
1,3-pentanediol, 3,4,4-trimethyl-	81756-50-5
1,4-pentanediol, 2,2,3-trimethyl-	Method H
1,4-pentanediol, 2,2,4-trimethyl-	80864-10-4
1,4-pentanediol, 2,3,3-trimethyl-	Method H
1,4-pentanediol, 2,3,4-trimethyl-	92340-74-4
1,4-pentanediol, 3,3,4-trimethyl-	16466-35-6
1,5-pentanediol, 2,2,3-trimethyl-	Method F
1,5-pentanediol, 2,2,4-trimethyl-	3465-14-3
1,5-pentanediol, 2,3,3-trimethyl-	Method A
1,5-pentanediol, 2,3,4-trimethyl-	85373-83-7
2,4-pentanediol, 2,3,3-trimethyl-	24892-51-1
2,4-pentanediol, 2,3,4-trimethyl-	24892-52-2

Preferred Isomers

<i>1,3-pentanediol, 2,2,3-trimethyl-</i>	<i>35512-54-0</i>
<i>1,3-pentanediol, 2,2,4-trimethyl-</i>	<i>144-19-4</i>
<i>1,3-pentanediol, 2,3,4-trimethyl-</i>	<i>116614-13-2</i>
<i>1,3-pentanediol, 2,4,4-trimethyl-</i>	<i>109387-36-2</i>
<i>1,3-pentanediol, 3,4,4-trimethyl-</i>	<i>81756-50-5</i>
<i>1,4-pentanediol, 2,2,3-trimethyl-</i>	Method H
<i>1,4-pentanediol, 2,2,4-trimethyl-</i>	80864-10-4
<i>1,4-pentanediol, 2,3,3-trimethyl-</i>	Method F
<i>1,4-pentanediol, 2,3,4-trimethyl-</i>	92340-74-4
<i>1,4-pentanediol, 3,3,4-trimethyl-</i>	16466-35-6
<i>1,5-pentanediol, 2,2,3-trimethyl-</i>	Method A
<i>1,5-pentanediol, 2,2,4-trimethyl-</i>	3465-14-3
<i>1,5-pentanediol, 2,3,3-trimethyl-</i>	Method A
<i>2,4-pentanediol, 2,3,4-trimethyl-</i>	24892-52-2

More Preferred Isomers

1,3-pentanediol, 2,3,4-trimethyl-	116614-13-2
1,4-pentanediol, 2,3,4-trimethyl-	92340-74-4
1,5-pentanediol, 2,2,3-trimethyl-	Method A
1,5-pentanediol, 2,2,4-trimethyl-	3465-14-3
1,5-pentanediol, 2,3,3-trimethyl-	Method A

Inoperable Isomers

1,2-pentanediol, 2,3,3-trimethyl-
1,2-pentanediol, 2,3,4-trimethyl-
1,2-pentanediol, 2,4,4-trimethyl-
1,2-pentanediol, 3,3,4-trimethyl-
1,2-pentanediol, 3,4,4-trimethyl-

2,3-pentanediol, 2,3,4-trimethyl-
2,3-pentanediol, 2,4,4-trimethyl-
2,3-pentanediol, 3,4,4-trimethyl-

ETHYLMETHYLPENTANEDIOL ISOMERS

Operable Isomers

1,3-pentanediol, 2-ethyl-2-methyl-	Method C
1,3-pentanediol, 2-ethyl-3-methyl-	Method D
1,3-pentanediol, 2-ethyl-4-methyl-	148904-97-6
1,3-pentanediol, 3-ethyl-2-methyl-	55661-05-7
1,4-pentanediol, 2-ethyl-2-methyl-	Method H
1,4-pentanediol, 2-ethyl-3-methyl-	Method F
1,4-pentanediol, 2-ethyl-4-methyl-	Method G
1,4-pentanediol, 3-ethyl-2-methyl-	Method F
1,4-pentanediol, 3-ethyl-3-methyl-	Method F
1,5-pentanediol, 2-ethyl-2-methyl-	Method F
1,5-pentanediol, 2-ethyl-3-methyl-	54886-83-8
1,5-pentanediol, 2-ethyl-4-methyl-	Method F
1,5-pentanediol, 3-ethyl-3-methyl-	57740-12-2
2,4-pentanediol, 3-ethyl-2-methyl-	Method G

More Preferred Isomers

1,3-pentanediol, 2-ethyl-2-methyl-	Method C
1,3-pentanediol, 2-ethyl-3-methyl-	Method D
1,3-pentanediol, 2-ethyl-4-methyl-	148904-97-6
1,3-pentanediol, 3-ethyl-2-methyl-	55661-05-7
1,4-pentanediol, 2-ethyl-2-methyl-	Method H
1,4-pentanediol, 2-ethyl-3-methyl-	Method F
1,4-pentanediol, 2-ethyl-4-methyl-	Method G
1,5-pentanediol, 3-ethyl-3-methyl-	57740-12-2
2,4-pentanediol, 3-ethyl-2-methyl-	Method G

Inoperable Isomers

1,2-pentanediol, 2-ethyl-3-methyl-
1,2-pentanediol, 2-ethyl-4-methyl-
1,2-pentanediol, 3-ethyl-2-methyl-
1,2-pentanediol, 3-ethyl-3-methyl-
1,2-pentanediol, 3-ethyl-4-methyl-
1,3-pentanediol, 3-ethyl-4-methyl-
1,4-pentanediol, 3-ethyl-4-methyl-
1,5-pentanediol, 3-ethyl-2-methyl-
2,3-pentanediol, 3-ethyl-2-methyl-
2,3-pentanediol, 3-ethyl-4-methyl-

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2,4-pentanediol, 3-ethyl-3-methyl-

PROPYLPENTANEDIOL ISOMERS**Operable Isomers**

1,3-pentanediol, 2-isopropyl-	Method D
1,3-pentanediol, 2-propyl-	Method C
1,4-pentanediol, 2-isopropyl-	Method H
1,4-pentanediol, 2-propyl-	Method H
1,4-pentanediol, 3-isopropyl-	Method H
1,5-pentanediol, 2-isopropyl-	90951-89-6
2,4-pentanediol, 3-propyl-	Method C

More Preferred Isomers

1,3-pentanediol, 2-isopropyl-	Method D
1,3-pentanediol, 2-propyl-	Method C
1,4-pentanediol, 2-isopropyl-	Method H
1,4-pentanediol, 2-propyl-	Method H
1,4-pentanediol, 3-isopropyl-	Method H
2,4-pentanediol, 3-propyl-	Method C

Inoperable Isomers

1,2-pentanediol, 2-propyl-
1,2-pentanediol, 2-isopropyl-
1,4-pentanediol, 3-propyl-
1,5-pentanediol, 2-propyl-
2,4-pentanediol, 3-isopropyl-

DIMETHYLHEXANEDIOL ISOMERS**Operable Isomers**

1,3-hexanediol, 2,2-dimethyl-	22006-96-8
1,3-hexanediol, 2,3-dimethyl-	Method D
1,3-hexanediol, 2,4-dimethyl-	78122-99-3
1,3-hexanediol, 2,5-dimethyl-	Method C
1,3-hexanediol, 3,4-dimethyl-	Method D
1,3-hexanediol, 3,5-dimethyl-	Method D
1,3-hexanediol, 4,4-dimethyl-	Method C
1,3-hexanediol, 4,5-dimethyl-	Method C
1,4-hexanediol, 2,2-dimethyl-	Method F
1,4-hexanediol, 2,3-dimethyl-	Method F
1,4-hexanediol, 2,4-dimethyl-	Method G

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1,4-hexanediol, 2,5-dimethyl-	22417-60-3
1,4-hexanediol, 3,3-dimethyl-	Method F
1,4-hexanediol, 3,4-dimethyl-	Method E
1,4-hexanediol, 3,5-dimethyl-	Method H
1,4-hexanediol, 4,5-dimethyl-	Method E
1,4-hexanediol, 5,5-dimethyl-	38624-38-3
1,5-hexanediol, 2,2-dimethyl-	Method A
1,5-hexanediol, 2,3-dimethyl-	62718-05-2
1,5-hexanediol, 2,4-dimethyl-	73455-82-0
1,5-hexanediol, 2,5-dimethyl-	58510-28-4
1,5-hexanediol, 3,3-dimethyl-	41736-99-6
1,5-hexanediol, 3,4-dimethyl-	Method A
1,5-hexanediol, 3,5-dimethyl-	Method G
1,5-hexanediol, 4,5-dimethyl-	Method F
1,6-hexanediol, 2,2-dimethyl-	13622-91-8
1,6-hexanediol, 2,3-dimethyl-	Method F
1,6-hexanediol, 2,4-dimethyl-	Method F
1,6-hexanediol, 2,5-dimethyl-	49623-11-2
1,6-hexanediol, 3,3-dimethyl-	Method F
1,6-hexanediol, 3,4-dimethyl-	65363-45-3
2,4-hexanediol, 2,3-dimethyl-	26344-17-2
2,4-hexanediol, 2,4-dimethyl-	29649-22-7
2,4-hexanediol, 2,5-dimethyl-	3899-89-6
2,4-hexanediol, 3,3-dimethyl-	42412-51-1
2,4-hexanediol, 3,4-dimethyl-	90951-83-0
2,4-hexanediol, 3,5-dimethyl-	159300-34-2
2,4-hexanediol, 4,5-dimethyl-	Method D
2,4-hexanediol, 5,5-dimethyl-	108505-10-8
2,5-hexanediol, 2,3-dimethyl-	Method G
2,5-hexanediol, 2,4-dimethyl-	Method G
2,5-hexanediol, 2,5-dimethyl-	110-03-2
2,5-hexanediol, 3,3-dimethyl-	Method H
2,5-hexanediol, 3,4-dimethyl-	99799-30-1
2,6-hexanediol, 3,3-dimethyl-	Method A

More Preferred Isomers

1,3-hexanediol, 2,2-dimethyl-	22006-96-8
1,3-hexanediol, 2,3-dimethyl-	Method D
1,3-hexanediol, 2,4-dimethyl-	78122-99-3
1,3-hexanediol, 2,5-dimethyl-	Method C
1,3-hexanediol, 3,4-dimethyl-	Method D
1,3-hexanediol, 3,5-dimethyl-	Method D
1,3-hexanediol, 4,4-dimethyl-	Method C
1,3-hexanediol, 4,5-dimethyl-	Method C
1,4-hexanediol, 2,2-dimethyl-	Method H
1,4-hexanediol, 2,3-dimethyl-	Method F

1,4-hexanediol, 2,4-dimethyl-
1,4-hexanediol, 2,5-dimethyl-
1,4-hexanediol, 3,3-dimethyl-
1,4-hexanediol, 3,4-dimethyl-
1,4-hexanediol, 3,5-dimethyl-
1,4-hexanediol, 4,5-dimethyl-
1,4-hexanediol, 5,5-dimethyl-
1,5-hexanediol, 2,2-dimethyl-
1,5-hexanediol, 2,3-dimethyl-
1,5-hexanediol, 2,4-dimethyl-
1,5-hexanediol, 2,5-dimethyl-
1,5-hexanediol, 3,3-dimethyl-
1,5-hexanediol, 3,4-dimethyl-
1,5-hexanediol, 3,5-dimethyl-
1,5-hexanediol, 4,5-dimethyl-
2,6-hexanediol, 3,3-dimethyl-

Method G
22417-60-3
Method F
Method E
Method H
Method E
38624-38-3
Method A
62718-05-2
73455-82-0
58510-28-4
41736-99-6
Method A
Method G
Method F
Method A

Inoperable Isomers

1,2-hexanediol, 2,3-dimethyl-
1,2-hexanediol, 2,4-dimethyl-
1,2-hexanediol, 2,5-dimethyl-
1,2-hexanediol, 3,3-dimethyl-
1,2-hexanediol, 3,4-dimethyl-
1,2-hexanediol, 3,5-dimethyl-
1,2-hexanediol, 4,4-dimethyl-
1,2-hexanediol, 4,5-dimethyl-
1,2-hexanediol, 5,5-dimethyl-
2,3-hexanediol, 2,3-dimethyl-
2,3-hexanediol, 2,4-dimethyl-
2,3-hexanediol, 2,5-dimethyl-
2,3-hexanediol, 3,4-dimethyl-
2,3-hexanediol, 3,5-dimethyl-
2,3-hexanediol, 4,4-dimethyl-
2,3-hexanediol, 4,5-dimethyl-
2,3-hexanediol, 5,5-dimethyl-
3,4-hexanediol, 2,2-dimethyl-
3,4-hexanediol, 2,3-dimethyl-
3,4-hexanediol, 2,4-dimethyl-
3,4-hexanediol, 2,5-dimethyl-
3,4-hexanediol, 3,4-dimethyl-

ETHYLHEXANEDIOL ISOMERS**More Preferred Isomers**

1,3-hexanediol, 2-ethyl-	94-96-2
1,3-hexanediol, 4-ethyl-	Method C
1,4-hexanediol, 2-ethyl-	148904-97-6
1,4-hexanediol, 4-ethyl-	1113-00-4
1,5-hexanediol, 2-ethyl-	58374-34-8
2,4-hexanediol, 3-ethyl-	Method C
2,4-hexanediol, 4-ethyl-	33683-47-5
2,5-hexanediol, 3-ethyl-	Method F

Inoperable Isomers

1,5-hexanediol, 4-ethyl-
1,6-hexanediol, 2-ethyl-
1,4-hexanediol, 3-ethyl-
1,5-hexanediol, 3-ethyl-
1,6-hexanediol, 3-ethyl-
1,2-hexanediol, 2-ethyl-
1,2-hexanediol, 3-ethyl-
1,2-hexanediol, 4-ethyl-
2,3-hexanediol, 3-ethyl-
2,3-hexanediol, 4-ethyl-
3,4-hexanediol, 3-ethyl-
1,3-hexanediol, 3-ethyl-

METHYLHEPTANEDIOL ISOMERS**Operable Isomers**

1,3-heptanediol, 2-methyl-	109417-38-1
1,3-heptanediol, 3-methyl-	165326-88-5
1,3-heptanediol, 4-methyl-	Method C
1,3-heptanediol, 5-methyl-	Method D
1,3-heptanediol, 6-methyl-	Method C
1,4-heptanediol, 2-methyl-	15966-03-7
1,4-heptanediol, 3-methyl-	7748-38-1
1,4-heptanediol, 4-methyl-	72473-94-0
1,4-heptanediol, 5-methyl-	63003-04-3
1,4-heptanediol, 6-methyl-	99799-25-4
1,5-heptanediol, 2-methyl-	141605-00-7
1,5-heptanediol, 3-methyl-	Method A
1,5-heptanediol, 4-methyl-	Method A
1,5-heptanediol, 5-methyl-	99799-26-5
1,5-heptanediol, 6-methyl-	57740-00-8

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1,6-heptanediol, 2-methyl-	132148-22-2
1,6-heptanediol, 3-methyl-	Method G
1,6-heptanediol, 4-methyl-	156307-84-5
1,6-heptanediol, 5-methyl-	Method A
1,6-heptanediol, 6-methyl-	5392-57-4
2,4-heptanediol, 2-methyl-	38836-26-9
2,4-heptanediol, 3-methyl-	6964-04-1
2,4-heptanediol, 4-methyl-	165326-87-4
2,4-heptanediol, 5-methyl-	Method C
2,4-heptanediol, 6-methyl-	79356-95-9
2,5-heptanediol, 2-methyl-	141605-02-9
2,5-heptanediol, 3-methyl-	Method G
2,5-heptanediol, 4-methyl-	156407-38-4
2,5-heptanediol, 5-methyl-	148843-72-5
2,5-heptanediol, 6-methyl-	51916-46-2
2,6-heptanediol, 2-methyl-	73304-48-0
2,6-heptanediol, 3-methyl-	29915-96-6
2,6-heptanediol, 4-methyl-	106257-69-6
3,4-heptanediol, 3-methyl-	18938-50-6
3,5-heptanediol, 2-methyl-	Method C
3,5-heptanediol, 3-methyl-	99799-27-6
3,5-heptanediol, 4-methyl-	156407-37-3

More Preferred Isomers

1,3-heptanediol, 2-methyl-	109417-38-1
1,3-heptanediol, 3-methyl-	165326-88-5
1,3-heptanediol, 4-methyl-	Method C
1,3-heptanediol, 5-methyl-	Method D
1,3-heptanediol, 6-methyl-	Method C
1,4-heptanediol, 2-methyl-	15966-03-7
1,4-heptanediol, 3-methyl-	7748-38-1
1,4-heptanediol, 4-methyl-	72473-94-0
1,4-heptanediol, 5-methyl-	63003-04-3
1,4-heptanediol, 6-methyl-	99799-25-4
1,5-heptanediol, 2-methyl-	141605-00-7
1,5-heptanediol, 3-methyl-	Method A
1,5-heptanediol, 4-methyl-	Method A
1,5-heptanediol, 5-methyl-	99799-26-5
1,5-heptanediol, 6-methyl-	57740-00-8
1,6-heptanediol, 2-methyl-	132148-22-2
1,6-heptanediol, 3-methyl-	Method G
1,6-heptanediol, 4-methyl-	156307-84-5
1,6-heptanediol, 5-methyl-	Method A
1,6-heptanediol, 6-methyl-	5392-57-4
2,4-heptanediol, 2-methyl-	38836-26-9
2,4-heptanediol, 3-methyl-	6964-04-1

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2,4-heptanediol, 4-methyl-	165326-87-4
2,4-heptanediol, 5-methyl-	Method C
2,4-heptanediol, 6-methyl-	79356-95-9
2,5-heptanediol, 2-methyl-	141605-02-9
2,5-heptanediol, 3-methyl-	Method H
2,5-heptanediol, 4-methyl-	156407-38-4
2,5-heptanediol, 5-methyl-	148843-72-5
2,5-heptanediol, 6-methyl-	51916-46-2
2,6-heptanediol, 2-methyl-	73304-48-0
2,6-heptanediol, 3-methyl-	29915-96-6
2,6-heptanediol, 4-methyl-	106257-69-6
3,4-heptanediol, 3-methyl-	18938-50-6
3,5-heptanediol, 2-methyl-	Method C
3,5-heptanediol, 4-methyl-	156407-37-3

Inoperable Isomers

1,7-heptanediol, 2-methyl-
1,7-heptanediol, 3-methyl-
1,7-heptanediol, 4-methyl-
2,3-heptanediol, 2-methyl-
2,3-heptanediol, 3-methyl-
2,3-heptanediol, 4-methyl-
2,3-heptanediol, 5-methyl-
2,3-heptanediol, 6-methyl-
3,4-heptanediol, 2-methyl-
3,4-heptanediol, 4-methyl-
3,4-heptanediol, 5-methyl-
3,4-heptanediol, 6-methyl-
1,2-heptanediol, 2-methyl-
1,2-heptanediol, 3-methyl-
1,2-heptanediol, 4-methyl-
1,2-heptanediol, 5-methyl-
1,2-heptanediol, 6-methyl-

OCTANEDIOL ISOMERS**More Preferred Isomers**

2,4-octanediol	90162-24-6
2,5-octanediol	4527-78-0
2,6-octanediol	Method A
2,7-octanediol	19686-96-5
3,5-octanediol	24892-55-5
3,6-octanediol	24434-09-1

Inoperable Isomers

1,2-octanediol	1117-86-8
1,3-octanediol	23433-05-8
1,4-octanediol	51916-47-3
1,5-octanediol	2736-67-6
1,6-octanediol	4060-76-6
1,7-octanediol	13175-32-1
1,8-octanediol	629-41-4
2,3-octanediol	e.g., 98464-24-5
3,4-octanediol	e.g., 99799-31-2
3,5-octanediol	e.g., 129025-63-4

TABLE V
NONANEDIOL ISOMERS

Chemical Name
Preferred Isomers

CAS No.

2,4-pentanediol, 2,3,3,4-tetramethyl- 19424-43-2

Operable Isomers

2,4-pentanediol, 3-tertiarybutyl-	142205-14-9
2,4-hexanediol, 2,5,5-trimethyl-	97460-08-7
2,4-hexanediol, 3,3,4-trimethyl-	Method D
2,4-hexanediol, 3,3,5-trimethyl-	27122-58-3
2,4-hexanediol, 3,5,5-trimethyl-	Method D
2,4-hexanediol, 4,5,5-trimethyl-	Method D
2,5-hexanediol, 3,3,4-trimethyl-	Method H
2,5-hexanediol, 3,3,5-trimethyl-	Method G

Inoperable Isomers

There are over 500 inoperable isomers including the following:

2,4-hexanediol, 2,4,5-trimethyl-	36587-81-2
2,4-hexanediol, 2,3,5-trimethyl-, erythro-	26344-20-7
2,4-hexanediol, 2,3,5-trimethyl-, threo-	26343-49-7
1,3-propanediol, 2-butyl-2-ethyl-	115-84-4
2,4-hexanediol, 2,3,5-trimethyl-, threo-	26343-49-7

TABLE VI
ALKYL GLYCERYL ETHERS, DI(HYDROXYALKYL) ETHERS, AND
ARYL GLYCERYL ETHERS

Preferred Monoglycerol Ethers and Derivatives

1,2-propanediol, 3-(butyloxy)-, triethoxylated
1,2-propanediol, 3-(butyloxy)-, tetraethoxylated

**More Preferred Monoglycerol Ethers
and Derivatives****CAS No.**
22636-32-4

1,2-propanediol, 3-(n-pentyloxy)-
1,2-propanediol, 3-(2-pentyloxy)-
1,2-propanediol, 3-(3-pentyloxy)-
1,2-propanediol, 3-(2-methyl-1-butyloxy)-
1,2-propanediol, 3-(iso-amylloxy)-
1,2-propanediol, 3-(3-methyl-2-butyloxy)-
1,2-propanediol, 3-(cyclohexyloxy)-
1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-
1,3-propanediol, 2-(pentyloxy)-
1,3-propanediol, 2-(2-pentyloxy)-
1,3-propanediol, 2-(3-pentyloxy)-
1,3-propanediol, 2-(2-methyl-1-butyloxy)-
1,3-propanediol, 2-(iso-amylloxy)-
1,3-propanediol, 2-(3-methyl-2-butyloxy)-
1,3-propanediol, 2-(cyclohexyloxy)-
1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-
1,2-propanediol, 3-(butyloxy)-, pentaethoxylated
1,2-propanediol, 3-(butyloxy)-, hexaethoxylated
1,2-propanediol, 3-(butyloxy)-, heptaethoxylated
1,2-propanediol, 3-(butyloxy)-, octaethoxylated
1,2-propanediol, 3-(butyloxy)-, nonaethoxylated
1,2-propanediol, 3-(butyloxy)-, monopropoxylated
1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated
1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated

More Preferred Di(hydroxyalkyl) Ethers

bis(2-hydroxybutyl) ether
bis(2-hydroxycyclopentyl) ether

Inoperable Monoglycerol Ethers

1,2-propanediol, 3-ethyloxy-
1,2-propanediol, 3-propyloxy-
1,2-propanediol, 3-isopropyloxy-
1,2-propanediol, 3-butyloxy-
1,2-propanediol, 3-isobutyloxy-
1,2-propanediol, 3-tert-butyloxy-
1,2-propanediol, 3-octyloxy-
1,2-propanediol, 3-(2-ethylhexyloxy)-
1,2-propanediol, 3-(cyclopentyloxy)-
1,2-propanediol, 3-(1-cyclohex-2-enyloxy)-
1,3-propanediol, 2-(1-cyclohex-2-enyloxy)-

AROMATIC GLYCERYL ETHERS

Operable Aromatic Glyceryl Ethers

1,2-propanediol, 3-phenyloxy-
 1,2-propanediol, 3-benzyloxy-
 1,2-propanediol, 3-(2-phenylethyloxy)-
 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-
 1,3-propanediol, 2-phenyloxy-
 1,3-propanediol, 2-(m-cresyloxy)-
 1,3-propanediol, 2-(p-cresyloxy)-
 1,3-propanediol, 2-benzyloxy-
 1,3-propanediol, 2-(2-phenylethyloxy)-
 1,3-propanediol, 2-(1-phenylethyloxy)-

Preferred Aromatic Glyceryl Ethers

1,2-propanediol, 3-phenyloxy-
 1,2-propanediol, 3-benzyloxy-
 1,2-propanediol, 3-(2-phenylethyloxy)-
 1,3-propanediol, 2-(m-cresyloxy)-
 1,3-propanediol, 2-(p-cresyloxy)-
 1,3-propanediol, 2-benzyloxy-
 1,3-propanediol, 2-(2-phenylethyloxy)-

Preferred Aromatic Glyceryl Ethers

1,2-propanediol, 3-phenyloxy-
 1,2-propanediol, 3-benzyloxy-
 1,2-propanediol, 3-(2-phenylethyloxy)-
 1,3-propanediol, 2-(m-cresyloxy)-
 1,3-propanediol, 2-(p-cresyloxy)-
 1,3-propanediol, 2-(2-phenylethyloxy)-

TABLE VII
ALICYCLIC DIOLS AND DERIVATIVES

Chemical Name	CAS No.
<u>Preferred Cylic Diols and Derivatives</u>	
<i>1-isopropyl-1,2-cyclobutanediol</i>	59895-32-8
<i>3-ethyl-4-methyl-1,2-cyclobutanediol</i>	
<i>3-propyl-1,2-cyclobutanediol</i>	
<i>3-isopropyl-1,2-cyclobutanediol</i>	42113-90-6
<i>1-ethyl-1,2-cyclopentanedilol</i>	67396-17-2

<i>1,2-dimethyl-1,2-cyclopentanediol</i>	33046-20-7
<i>1,4-dimethyl-1,2-cyclopentanediol</i>	89794-56-9
<i>2,4,5-trimethyl-1,3-cyclopentanediol</i>	
<i>3,3-dimethyl-1,2-cyclopentanediol</i>	89794-57-0
<i>3,4-dimethyl-1,2-cyclopentanediol</i>	70051-69-3
<i>3,5-dimethyl-1,2-cyclopentanediol</i>	89794-58-1
<i>3-ethyl-1,2-cyclopentanediol</i>	
<i>4,4-dimethyl-1,2-cyclopentanediol</i>	70197-54-5
<i>4-ethyl-1,2-cyclopentanediol</i>	
<i>1,1-bis(hydroxymethyl)cyclohexane</i>	2658-60-8
<i>1,2-bis(hydroxymethyl)cyclohexane</i>	76155-27-6
<i>1,2-dimethyl-1,3-cyclohexanediol</i>	53023-07-7
<i>1,3-bis(hydroxymethyl)cyclohexane</i>	13022-98-5
<i>1,3-dimethyl-1,3-cyclohexanediol</i>	128749-93-9
<i>1,6-dimethyl-1,3-cyclohexanediol</i>	164713-16-0
<i>1-hydroxy-cyclohexaneethanol</i>	40894-17-5
<i>1-hydroxy-cyclohexanemethanol</i>	15753-47-6
<i>1-ethyl-1,3-cyclohexanediol</i>	10601-18-0
<i>1-methyl-1,2-cyclohexanediol</i>	52718-65-7
<i>2,2-dimethyl-1,3-cyclohexanediol</i>	114693-83-3
<i>2,3-dimethyl-1,4-cyclohexanediol</i>	70156-82-0
<i>2,4-dimethyl-1,3-cyclohexanediol</i>	
<i>2,5-dimethyl-1,3-cyclohexanediol</i>	
<i>2,6-dimethyl-1,4-cyclohexanediol</i>	34958-42-4
<i>2-ethyl-1,3-cyclohexanediol</i>	155433-88-8
<i>2-hydroxycyclohexaneethanol</i>	24682-42-6
<i>2-hydroxyethyl-1-cyclohexanol</i>	
<i>2-hydroxymethylcyclohexanol</i>	89794-52-5
<i>3-hydroxyethyl-1-cyclohexanol</i>	
<i>3-hydroxycyclohexaneethanol</i>	86576-87-6
<i>3-hydroxymethylcyclohexanol</i>	
<i>3-methyl-1,2-cyclohexanediol</i>	23477-91-0
<i>4,4-dimethyl-1,3-cyclohexanediol</i>	14203-50-0
<i>4,5-dimethyl-1,3-cyclohexanediol</i>	
<i>4,6-dimethyl-1,3-cyclohexanediol</i>	16066-66-3
<i>4-ethyl-1,3-cyclohexanediol</i>	
<i>4-hydroxyethyl-1-cyclohexanol</i>	
<i>4-hydroxymethylcyclohexanol</i>	33893-85-5
<i>4-methyl-1,2-cyclohexanediol</i>	23832-27-1
<i>5,5-dimethyl-1,3-cyclohexanediol</i>	51335-83-2
<i>5-ethyl-1,3-cyclohexanediol</i>	
<i>1,2-cycloheptanediol</i>	108268-28-6
<i>2-methyl-1,3-cycloheptanediol</i>	101375-80-8
<i>2-methyl-1,4-cycloheptanediol</i>	
<i>4-methyl-1,3-cycloheptanediol</i>	

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5-methyl-1,3-cycloheptanediol
 5-methyl-1,4-cycloheptanediol
 6-methyl-1,4-cycloheptanediol

90201-00-6

1,3-cyclooctanediol

101935-36-8

1,4-cyclooctanediol

73982-04-4

1,5-cyclooctanediol

23418-82-8

1,2-cyclohexanediol, diethoxylate
 1,2-cyclohexanediol, triethoxylate
 1,2-cyclohexanediol, tetraethoxylate
 1,2-cyclohexanediol, pentaethoxylate
 1,2-cyclohexanediol, hexaethoxylate
 1,2-cyclohexanediol, heptaethoxylate
 1,2-cyclohexanediol, octaethoxylate
 1,2-cyclohexanediol, nonaethoxylate
 1,2-cyclohexanediol, monopropoxylate
 1,2-cyclohexanediol, monobutylenoxyate
 1,2-cyclohexanediol, dibutylenoxyate
 1,2-cyclohexanediol, tributylenoxyate

Chemical Name**CAS No.****More Preferred Cyclic Diols and Derivatives**

1-isopropyl-1,2-cyclobutanediol
 3-ethyl-4-methyl-1,2-cyclobutanediol

59895-32-8

3-propyl-1,2-cyclobutanediol

3-isopropyl-1,2-cyclobutanediol

42113-90-6

1-ethyl-1,2-cyclopentanediol

67396-17-2

1,2-dimethyl-1,2-cyclopentanediol

33046-20-7

1,4-dimethyl-1,2-cyclopentanediol

89794-56-9

3,3-dimethyl-1,2-cyclopentanediol

89794-57-0

3,4-dimethyl-1,2-cyclopentanediol

70051-69-3

3,5-dimethyl-1,2-cyclopentanediol

89794-58-1

3-ethyl-1,2-cyclopentanediol

4,4-dimethyl-1,2-cyclopentanediol

70197-54-5

4-ethyl-1,2-cyclopentanediol

1,1-bis(hydroxymethyl)cyclohexane

2658-60-8

1,2-bis(hydroxymethyl)cyclohexane

76155-27-6

1,2-dimethyl-1,3-cyclohexanediol

53023-07-7

1,3-bis(hydroxymethyl)cyclohexane

13022-98-5

1-hydroxy-cyclohexanemethanol

15753-47-6

1-methyl-1,2-cyclohexanediol

52718-65-7

3-hydroxymethylcyclohexanol

3-methyl-1,2-cyclohexanediol

23477-91-0

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4,4-dimethyl-1,3-cyclohexanediol	14203-50-0
4,5-dimethyl-1,3-cyclohexanediol	
4,6-dimethyl-1,3-cyclohexanediol	16066-66-3
4-ethyl-1,3-cyclohexanediol	
4-hydroxyethyl-1-cyclohexanol	
4-hydroxymethylcyclohexanol	33893-85-5
4-methyl-1,2-cyclohexanediol	23832-27-1
1,2-cycloheptanediol	108268-28-6

1,2-cyclohexanediol, pentaethoxylate
 1,2-cyclohexanediol, hexaethoxylate
 1,2-cyclohexanediol, heptaethoxylate
 1,2-cyclohexanediol, octaethoxylate
 1,2-cyclohexanediol, nonaethoxylate
 1,2-cyclohexanediol, monopropoxylate
 1,2-cyclohexanediol, dibutylenoxyate

The unsaturated alicyclic diols include the following known unsaturated alicyclic diols:

Operable Unsaturated Alicyclic Diols

Chemical Name	CAS No.
1,2-Cyclobutanediol, 1-ethenyl-2-ethyl-	58016-14-1
3-Cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-	90112-64-4
3-Cyclobutene-1,2-diol, 3,4-diethyl-	142543-60-0
3-Cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-	142543-56-4
3-Cyclobutene-1,2-diol, 3-butyl-	142543-55-3
1,2-Cyclopentanediol, 1,2-dimethyl-4-methylene-	103150-02-3
1,2-Cyclopentanediol, 1-ethyl-3-methylene-	90314-52-6
1,2-Cyclopentanediol, 4-(1-propenyl)	128173-45-5
3-Cyclopentene-1,2-diol, 1-ethyl-3-methyl-	90314-43-5
1,2-Cyclohexanediol, 1-ethenyl-	134134-16-0
1,2-Cyclohexanediol, 1-methyl-3-methylene-	98204-78-5
1,2-Cyclohexanediol, 1-methyl-4-methylene-	133358-53-9
1,2-Cyclohexanediol, 3-ethenyl-	55310-51-5
1,2-Cyclohexanediol, 4-ethenyl-	85905-16-4
3-Cyclohexene-1,2-diol, 2,6-dimethyl-	81969-75-7
3-Cyclohexene-1,2-diol, 6,6-dimethyl-	61875-93-2
4-Cyclohexene-1,2-diol, 3,6-dimethyl-	156808-73-0
4-Cyclohexene-1,2-diol, 4,5-dimethyl-	154351-54-9
3-Cyclooctene-1,2-diol	170211-27-5

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4-Cyclooctene-1,2-diol	124791-61-3
5-Cyclooctene-1,2-diol	117468-07-2

Inoperable Unsaturated Cyclic Diols

1,2-Cyclopentanediol, 1-(1-methylethenyl)-	61447-83-4
1,2-Propanediol, 1-cyclopentyl-	55383-20-5
1,3-Cyclopentanediol, 2-(1-methylethylidene)-	65651-46-9
1,3-Propanediol, 2-(1-cyclopenten-1-yl)-	77192-43-9
1,3-Propanediol, 2-(2-cyclopenten-1-yl)-	25462-31-1
1,2-Ethanediol, 1-(1-cyclohexen-1-yl)-	151674-61-2
1,2-Ethanediol, 1-(3-cyclohexen-1-yl)-	64011-53-6
2-Cyclohexene-1,4-diol, 5,5-dimethyl-	147274-55-3
4-Cyclohexene-1,3-diol, 3,6-dimethyl-	127716-90-9
1,3-Cycloheptanediol, 2-methylene-	132292-67-2
5-Cycloheptene-1,3-diol, 1-methyl-	160813-33-2
5-Cycloheptene-1,3-diol, 5-methyl-	160813-32-1
2-Cyclooctene-1,4-diol	37996-40-0

TABLE VIII
C₃C₇DIOL ALKOXYLATED DERIVATIVES

In the following tables, "EO" means polyethoxylates, i.e., $-(CH_2CH_2O)_nH$; Me-E_n means methyl-capped polyethoxylates $-(CH_2CH_2O)_nCH_3$; "2(Me-E_n)" means 2 Me-E_n groups needed; "PO" means polypropoxylates, $-(CH(CH_3)CH_2O)_nH$; "BO" means polybutyleneoxy groups, $-(CH(CH_2CH_3)CH_2O)_nH$; and "n-BO" means poly(n-butyleneoxy) or poly(tetramethylene)oxy groups $-(CH_2CH_2CH_2CH_2O)_nH$. The indicated alkoxyated derivatives are all operable and those that are preferred are in bold type and listed on the second line. Non-limiting, typical synthesis methods to prepare the alkoxyated derivatives are given hereinafter.

TABLE VIIIA

Base Material ^(a)	Base Material CAS No.	EO's	1(Me-E _n)	2(Me-E _n)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-propanediol (C3)	57-55-6			1-4 3-4	4		
1,2-propanediol, 2-methyl- (C4)	558-43-0		4-10 8-10	1	3		1

1,3-propanediol (C3)	504-63-2			6-8 8	5-6 6		
1,3-propanediol, 2,2-diethyl- (C7)	115-76-4	1-7 4-7			1 2	1-2 2	
1,3-propanediol, 2,2-dimethyl- (C5)	126-30-7			1-2	3-4 4		
1,3-propanediol, 2-(1-methylpropyl)- (C7)	33673-01-7	1-7 4-7			1 2	1-2 2	
1,3-propanediol, 2-(2-methylpropyl)- (C7)	26462-20-8	1-7 4-7			1 2	1-2 2	
1,3-propanediol, 2-ethyl- (C5)	2612-29-5		6-10 9-10	1	3		
1,3-propanediol, 2-ethyl-2-methyl- (C6)	77-84-9		1-6 3-6		2		1
1,3-propanediol, 2-isopropyl- (C6)	2612-27-3		1-6 3-6		2		1
1,3-propanediol, 2-methyl- (C4)	2163-42-0			2-5 4-5	4-5 5		2
1,3-propanediol, 2-methyl-2-isopropyl- (C7)	2109-23-1	2-9 6-9			1	1-3 2-3	
1,3-propanediol, 2-methyl-2-propyl- (C7)	78-26-2	1-7 4-7			1	1-2 2	
1,3-propanediol, 2-propyl- (C6)	2612-28-4		1-4		2		1

- (a) The number of indicated alkoxyated groups in this and following Tables VIII are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.
- (b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.
- (c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.
- (d) The numbers in this column are average numbers of (CH₂CH₂O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.
- (e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.
- (f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.
- (g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIIB

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	2(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-butanediol (C4)	584-03-2		2-8 6-8		2-3		1

1,2-butanediol, 2,3-dimethyl- (C6)	66553-15-9	1-6 2-5				1-2 1	
1,2-butanediol, 2-ethyl- (C6)	66553-16-0	1-3				1	
1,2-butanediol, 2-methyl- (C5)	41051-72-3		1-2		1		
1,2-butanediol, 3,3-dimethyl- (C6)	59562-82-2	1-6 2-5				1-2 1	
1,2-butanediol, 3-methyl- (C5)	50468-22-9		1-2		1		
1,3-butanediol (C4)	107-88-0			3-6 5-6	5		2
1,3-butanediol, 2, 2,3-trimethyl- (C7)	16343-75-2		1-3		1-2 2		
1,3-butanediol, 2, 2-dimethyl- (C6)	76-35-7		3-8 6-8		3		
1,3-butanediol, 2,3-dimethyl- (C6)	24893-35-4		3-8 6-8		3		
1,3-butanediol, 2-ethyl- (C6)	66553-17-1		1-6 4-6		2 to 3		1
1,3-butanediol, 2- ethyl-2-methyl- (C7)	Method C		1		1	2-4 3	
1,3-butanediol, 2- ethyl-3-methyl- (C7)	68799-03-1		1		1	2-4 3	
1,3-butanediol, 2-isopropyl- (C7)	66567-04-2		1		1	2-4 3	
1,3-butanediol, 2-methyl- (C5)	684-84-4			1-3 2-3	4		
1,3-butanediol, 2-propyl- (C7)	66567-03-1	2-9 6-8			1	1-3 2-3	
1,3-butanediol, 3-methyl- (C5)	2568-33-4			1-3 2-3	4		
1,4-butanediol (C4)	110-63-4			2-4 3-4	4-5 4-5		2
1,4-butanediol, 2, 2,3-trimethyl- (C7)	162108-60-3	2-9 6-9			1	1-3 2-3	
1,4-butanediol, 2,2-dimethyl- (C6)	32812-23-0		1-6 3-6		2		1
1,4-butanediol, 2,3-dimethyl- (C6)	57716-80-0		1-6 3-6		2		1
1,4-butanediol, 2-ethyl- (C6)	57716-79-7		1-4		2		1
1,4-butanediol, 2- ethyl-2-methyl- (C7)	76651-98-4	1-7 4-7			1	1-2 2	
1,4-butanediol, 2- ethyl-3-methyl- (C7)	66225-34-1	1-7 4-7			1	1-2 2	
1,4-butanediol, 2-isopropyl- (C7)	39497-66-0	1-7 4-7			1	1-2 2	

1,4-butanediol, 2-methyl- (C5)	2938-98-9		6-10 9-10	1	3		1
1,4-butanediol, 2-propyl- (C7)	62946-68-3	1-5 2-5				1-2 1	
1,4-butanediol, 3- ethyl-1-methyl- (C7)	Method F	2-9 6-8			1	1-3 2-3	
2,3-butanediol (C4)	513-85-9		6-10 9-10	1	3-4		1
2,3-butanediol, 2,3-dimethyl- (C6)	76-09-5	3-9 7-9			1	1-3 2-3	
2,3-butanediol, 2-methyl- (C5)	5396-58-7		1-5 2-5		2		1

(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH_2CH_2O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH_2CH_2O) groups in the one methyl-capped polyethoxylate substituent in each derivative.

(d) The numbers in this column are average numbers of (CH_2CH_2O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.

(e) The numbers in this column are average numbers of $(CH(CH_3)CH_2O)$ groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of $(CH_2CH_2CH_2CH_2O)$ groups in the polytetramethyleneoxylated derivative.

(g) The numbers in this column are average numbers of $(CH(CH_2CH_3)CH_2O)$ groups in the polybutoxylated derivative.

TABLE VIIC

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	2(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(d)	(e)	(f)	(g)
1,2-pentanediol (C5)	5343-92-0	3-10 7-10			1	2-3 3	
1,2-pentanediol, 2-methyl- (C6)	20667-05-4	1-3				1	
1,2-pentanediol, 3-methyl- (C6)	159623-53-7	1-3				1	
1,2-pentanediol, 4-methyl- (C6)	72110-08-8	1-3				1	
1,3-pentanediol (C5)	3174-67-2			1-2	3-4		
1,3-pentanediol, 2,2-dimethyl- (C7)	2157-31-5		1		1	2-4 3	
1,3-pentanediol, 2,3-dimethyl- (C7)	66225-52-3		1		1	2-4 3	

1,3-pentanediol, 2,4-dimethyl- (C7)	60712-38-1		1		1	2-4 3	
1,3-pentanediol, 2-ethyl- (C7)	29887-11-4	2-9 6-8			1	1-3 2-3	
1,3-pentanediol, 2-methyl- (C6)	149-31-5		1-6 4-6		2-3		1
1,3-pentanediol, 3,4-dimethyl- (C7)	129851-50-9		1		1	2-4 3	
1,3-pentanediol, 3-methyl- (C6)	33879-72-0		1-6 4-6		2-3		1
1,3-pentanediol, 4,4-dimethyl- (C7)	30458-16-3		1		1	2-4 3	
1,3-pentanediol, 4-methyl- (C6)	54876-99-2		1-6 4-6		2-3		1
1,4-pentanediol (C5)	626-95-9			1-2	3-4		
1,4-pentanediol, 2,2-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2,3-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2,4-dimethyl- (C7)	Method F		1		1	2-4 3	
1,4-pentanediol, 2-methyl- (C6)	6287-17-8		1-6 4-6		2-3		1
1,4-pentanediol, 3,3-dimethyl- (C7)	81887-62-9		1		1	2-4 3	
1,4-pentanediol, 3,4-dimethyl- (C7)	63521-36-8		1		1	2-4 3	
1,4-pentanediol, 3-methyl- (C6)	26787-63-3		1-6 4-6		2-3		1
1,4-pentanediol, 4-methyl- (C6)	1462-10-8		1-6 4-6		2-3		1
1,5-pentanediol (C5)	111-29-5		4-10 8-10	1	3		
1,5-pentanediol, 2,2-dimethyl- (C7)	3121-82-2	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2,3-dimethyl- (C7)	81554-20-3	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2,4-dimethyl- (C7)	2121-69-9	1-7 4-7			1	1-2 2	
1,5-pentanediol, 2-ethyl- (C7)	14189-13-0	1-5 2-5				1-2 1	
1,5-pentanediol, 2-methyl- (C6)	42856-62-2		1-4		2		
1,5-pentanediol, 3,3-dimethyl- (C7)	53120-74-4	1-7 4-7			1	1-2 2	
1,5-pentanediol, 3-methyl- (C6)	4457-71-0		1-4		2		

2,3-pentanediol (C5)	42027-23-6		1-3		2		
2,3-pentanediol, 2-methyl- (C6)	7795-80-4	1-7 4-7			1	1-2 2	
2,3-pentanediol, 3-methyl- (C6)	63521-37-9	1-7 4-7			1	1-2 2	
2,3-pentanediol, 4-methyl- (C6)	7795-79-1	1-7 4-7			1	1-2 2	
2,4-pentanediol (C5)	625-69-4			1-4 2-4	4		
2,4-pentanediol, 2,3-dimethyl- (C7)	24893-39-8		1-4 2-4		2		
2,4-pentanediol, 2,4-dimethyl- (C7)	24892-49-7		1-4 2-4		2		
2,4-pentanediol, 2-methyl- (C6)	107-41-5		5-10 8-10		3		
2,4-pentanediol, 3,3-dimethyl- (C7)	24892-50-0		1-4 2-4		2		
2,4-pentanediol, 3-methyl- (C6)	Method H		5-10 8-10		3		

- (a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.
- (b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.
- (c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituent in each derivative.
- (d) The numbers in this column are average numbers of (CH₂CH₂O) groups in each of the two methyl-capped polyethoxylate substituents in each derivative.
- (e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.
- (f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.
- (g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIII

Base Material(a)	Base Material CAS No.	EO's	1(Me-En)	PO's	n-BO's	BO's
		(b)	(c)	(e)	(f)	(g)
1,3-hexanediol (C6)	21531-91-9		1-5 2-5	2		1
1,3-hexanediol, 2-methyl- (C7)	66072-21-7	2-9 6-8		1	1-3 2-3	1
1,3-hexanediol, 3-methyl- (C7)	Method D	2-9 6-8		1	1-3 2-3	

1,3-hexanediol, 4-methyl-(C7)	Method C	2-9 6-8		1	1-3 2-3	
1,3-hexanediol, 5-methyl-(C7)	109863-14-1	2-9 6-8		1	1-3 2-3	
1,4-hexanediol (C6)	16432-53-4		1-5 2-5	2		1
1,4-hexanediol, 2-methyl-(C7)	Method F	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 3-methyl-(C7)	66225-36-3	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 4-methyl-(C7)	40646-08-0	2-9 6-8		1	1-3 2-3	
1,4-hexanediol, 5-methyl-(C7)	38624-36-1	2-9 6-8		1	1-3 2-3	
1,5-hexanediol (C6)	928-40-5		1-5 2-5	2		1
1,5-hexanediol, 2-methyl-(C7)	Method F	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 3-methyl-(C7)	Method F	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 4-methyl-(C7)	66225-37-4	2-9 6-8		1	1-3 2-3	
1,5-hexanediol, 5-methyl-(C7)	1462-11-9	2-9 6-8		1	1-3 2-3	
1,6-hexanediol (C6)	629-11-8		1-2	1-2	4	
1,6-hexanediol, 2-methyl-(C7)	25258-92-8	1-5 2-5			1-2 1	
1,6-hexanediol, 3-methyl-(C7)	4089-71-8	1-5 2-5			1-2 1	
2,3-hexanediol (C6)	617-30-1	1-5 2-5			1-2 1	
2,4-hexanediol (C6)	19780-90-6		3-8 5-8	3		
2,4-hexanediol, 2-methyl-(C7)	66225-35-2		1-2	1-2		
2,4-hexanediol, 3-methyl-(C7)	116530-79-1		1-2	1-2		
2,4-hexanediol, 4-methyl-(C7)	38836-25-8		1-2	1-2		
2,4-hexanediol, 5-methyl-(C7)	54877-00-8		1-2	1-2		
2,5-hexanediol (C6)	2935-44-6		3-8 5-8	3		
2,5-hexanediol, 2-methyl-(C7)	29044-06-2		1-2	1-2		
2,5-hexanediol, 3-methyl-(C7)	Method H		1-2	1-2		

3,4-hexanediol (C6)	922-17-8	1-5 2-5			1	
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(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(e) The numbers in this column are average numbers of (CH(CH₃)CH₂O) groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of (CH₂CH₂CH₂CH₂O) groups in the polytetramethyleneoxylated derivative.

(g) The numbers in this column are average numbers of (CH(CH₂CH₃)CH₂O) groups in the polybutoxylated derivative.

TABLE VIII

Base Material(a)	Base Material CAS No.	EO's (b)	I(Me-En) (c)	PO's (e)	n-BO's (f)
1,3-heptanediol (C7)	23433-04-7	1-7 3-6		1	1-2 2
1,4-heptanediol (C7)	40646-07-9	1-7 3-6		1	1-2 2
1,5-heptanediol (C7)	60096-09-5	1-7 3-6		1	1-2 2
1,6-heptanediol (C7)	13175-27-4	1-7 3-6		1	1-2 2
1,7-heptanediol (C7)	629-30-1	1-2			1
2,4-heptanediol (C7)	20748-86-1	3-10 7-10	1	1	3
2,5-heptanediol (C7)	70444-25-6	3-10 7-10	1	1	3
2,6-heptanediol (C7)	5969-12-0	3-10 7-10	1	1	3
3,5-heptanediol (C7)	86632-40-8	3-10 7-10	1	1	3

(a) The number of indicated alkoxyated groups in this Table are all operable, the generic limits being listed on the first line, and those that are preferred are in bold type and listed on the second line.

(b) The numbers in this column are average numbers of (CH₂CH₂O) groups in the polyethoxylated derivative.

(c) The numbers in this column are average numbers of (CH₂CH₂O) groups in the one methyl-capped polyethoxylate substituant in each derivative.

(e) The numbers in this column are average numbers of $(\text{CH}(\text{CH}_3)\text{CH}_2\text{O})$ groups in the polypropoxylated derivative.

(f) The numbers in this column are average numbers of $(\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{O})$ groups in the polytetramethyleneoxylated derivative.

Table IX
AROMATIC DIOLS

Suitable aromatic diols include:

Chemical Name	CAS No.
<u>Operable Aromatic Diols</u>	
1-phenyl-1,2-ethanediol	93-56-1
1-phenyl-1,2-propanediol	1855-09-0
2-phenyl-1,2-propanediol	87760-50-7
3-phenyl-1,2-propanediol	17131-14-5
1-(3-methylphenyl)-1,3-propanediol	51699-43-5
1-(4-methylphenyl)-1,3-propanediol	159266-06-5
2-methyl-1-phenyl-1,3-propanediol	139068-60-3
1-phenyl-1,3-butanediol	118100-60-0
3-phenyl-1,3-butanediol	68330-54-1
1-phenyl-1,4-butanediol	136173-88-1
2-phenyl-1,4-butanediol	95840-73-6
1-phenyl-2,3-butanediol	169437-68-7
<u>Preferred Aromatic Diols</u>	
<i>1-phenyl-1,2-ethanediol</i>	<i>93-56-1</i>
<i>1-phenyl-1,2-propanediol</i>	<i>1855-09-0</i>
<i>2-phenyl-1,2-propanediol</i>	<i>87760-50-7</i>
<i>3-phenyl-1,2-propanediol</i>	<i>17131-14-5</i>
<i>1-(3-methylphenyl)-1,3-propanediol</i>	<i>51699-43-5</i>
<i>1-(4-methylphenyl)-1,3-propanediol</i>	<i>159266-06-5</i>
<i>2-methyl-1-phenyl-1,3-propanediol</i>	<i>139068-60-3</i>
<i>1-phenyl-1,3-butanediol</i>	<i>118100-60-0</i>
<i>3-phenyl-1,3-butanediol</i>	<i>68330-54-1</i>
<i>1-phenyl-1,4-butanediol</i>	<i>136173-88-1</i>
<u>More Preferred Aromatic Diols</u>	
1-phenyl-1,2-propanediol	1855-09-0
2-phenyl-1,2-propanediol	87760-50-7
3-phenyl-1,2-propanediol	17131-14-5
1-(3-methylphenyl)-1,3-propanediol	51699-43-5
1-(4-methylphenyl)-1,3-propanediol	159266-06-5
2-methyl-1-phenyl-1,3-propanediol	139068-60-3

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3-phenyl-1,3-butanediol
1-phenyl-1,4-butanediol

68330-54-1
136173-88-1

Inoperable Aromatic Diols

1-phenyl-1,3-propanediol	
2-phenyl-1,3-propanediol	
1-phenyl-1,2-butanediol	154902-08-6
2-phenyl-1,2-butanediol	157008-55-4
3-phenyl-1,2-butanediol	141505-72-8
4-phenyl-1,2-butanediol	143615-31-0
2-phenyl-1,3-butanediol	103941-94-2
4-phenyl-1,3-butanediol	81096-91-5
2-phenyl-2,3-butanediol	138432-94-7

X. principal solvents which are homologs, or analogs, of the above structures where the total number of hydrogen atoms is increased by the addition of one, or more additional CH₂ groups, the total number of hydrogen atoms being kept at the same number by introducing double bonds, are also useful with examples including the following known compounds:

TABLE X
EXAMPLES OF UNSATURATED COMPOUNDS

Operable Unsaturated Diols

1,3-Propanediol, 2,2-di-2-propenyl-	55038-13-6
1,3-Propanediol, 2-(1-pentenyl)-	138436-18-7
1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-	121887-76-1
1,3-Propanediol, 2-(3-methyl-1-butenyl)-	138436-17-6
1,3-Propanediol, 2-(4-pentenyl)-	73012-46-1
1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-	91367-61-2
1,3-Propanediol, 2-ethyl-2-(2-propenyl)-	27606-26-4
1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-	132130-95-1
1,3-Butanediol, 2,2-diallyl-	103985-49-5
1,3-Butanediol, 2-(1-ethyl-1-propenyl)-	116103-35-6
1,3-Butanediol, 2-(2-butenyl)-2-methyl-	92207-83-5
1,3-Butanediol, 2-(3-methyl-2-butenyl)-	98955-19-2
1,3-Butanediol, 2-ethyl-2-(2-propenyl)-	122761-93-7
1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-	141585-58-2
1,4-Butanediol, 2,3-bis(1-methylethylidene)-	52127-63-6
1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-	115895-78-8
2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-	91154-01-7
2-Butene-1,4-diol, 2-(1-methylpropyl)-	91154-00-6
2-Butene-1,4-diol, 2-butyl-	153943-66-9

1,3-Pentanediol, 2-ethenyl-3-ethyl-	104683-37-6
1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-	143447-08-9
1,4-Pentanediol, 3-methyl-2-(2-propenyl)-	139301-86-3
1,5-Pentanediol, 2-(1-propenyl)-	84143-44-2
1,5-Pentanediol, 2-(2-propenyl)-	134757-01-0
1,5-Pentanediol, 2-ethylidene-3-methyl-	42178-93-8
1,5-Pentanediol, 2-propylidene-	58203-50-2
2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-	88610-19-9
4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-	109788-04-7
4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-	90676-97-4
1,4-Hexanediol, 4-ethyl-2-methylene-	66950-87-6
1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-	18984-03-7
1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-	18927-12-3
1,5-Hexanediol, 2-(1-methylethenyl)-	96802-18-5
1,6-Hexanediol, 2-ethenyl-	66747-31-7
1-Hexene-3,4-diol, 5,5-dimethyl-	169736-29-2
1-Hexene-3,4-diol, 5,5-dimethyl-	120191-04-0
2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-	70101-76-7
3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-	112763-52-7
3-Hexene-1,6-diol, 2-ethyl-	84143-45-3
3-Hexene-1,6-diol, 3,4-dimethyl-	125032-66-8
4-Hexene-2,3-diol, 2,5-dimethyl-	13295-61-9
4-Hexene-2,3-diol, 3,4-dimethyl-	135367-17-8
5-Hexene-1,3-diol, 3-(2-propenyl)-	74693-24-6
5-Hexene-2,3-diol, 2,3-dimethyl-	154386-00-2
5-Hexene-2,3-diol, 3,4-dimethyl-	135096-13-8
5-Hexene-2,3-diol, 3,5-dimethyl-	134626-63-4
5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-	155751-24-9
1,4-Heptanediol, 6-methyl-5-methylene-	100590-29-2
1,5-Heptadiene-3,4-diol, 2,3-dimethyl-	18927-06-5
1,5-Heptadiene-3,4-diol, 2,5-dimethyl-	22607-16-5
1,5-Heptadiene-3,4-diol, 3,5-dimethyl-	18938-51-7
1,7-Heptanediol, 2,6-bis(methylene)-	139618-24-9
1,7-Heptanediol, 4-methylene-	71370-08-6
1-Heptene-3,5-diol, 2,4-dimethyl-	155932-77-7
1-Heptene-3,5-diol, 2,6-dimethyl-	132157-35-8
1-Heptene-3,5-diol, 3-ethenyl-5-methyl	61841-10-9
1-Heptene-3,5-diol, 6,6-dimethyl-	109788-01-4
2,4-Heptadiene-2,6-diol, 4,6-dimethyl-	102605-95-8
2,5-Heptadiene-1,7-diol, 4,4-dimethyl-	162816-19-5
2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-	115346-30-0
2-Heptene-1,4-diol, 5,6-dimethyl-	103867-76-1
2-Heptene-1,5-diol, 5-ethyl-	104683-39-8
2-Heptene-1,7-diol, 2-methyl-	74868-68-1
3-Heptene-1,5-diol, 4,6-dimethyl-	147028-45-3

3-Heptene-1,7-diol, 3-methyl-6-methylene-	109750-55-2
3-Heptene-2,5-diol, 2,4-dimethyl-	98955-40-9
3-Heptene-2,5-diol, 2,5-dimethyl-	24459-23-2
3-Heptene-2,6-diol, 2,6-dimethyl-	160524-66-3
3-Heptene-2,6-diol, 4,6-dimethyl-	59502-66-8
5-Heptene-1,3-diol, 2,4-dimethyl-	123363-69-9
5-Heptene-1,3-diol, 3,6-dimethyl-	96924-52-6
5-Heptene-1,4-diol, 2,6-dimethyl-	106777-98-4
5-Heptene-1,4-diol, 3,6-dimethyl-	106777-99-5
5-Heptene-2,4-diol, 2,3-dimethyl-	104651-56-1
6-Heptene-1,3-diol, 2,2-dimethyl-	140192-39-8
6-Heptene-1,4-diol, 4-(2-propenyl)-	1727-87-3
6-Heptene-1,4-diol, 5,6-dimethyl-	152344-16-6
6-Heptene-1,5-diol, 2,4-dimethyl-	74231-27-9
6-Heptene-1,5-diol, 2-ethylidene-6-methyl-	91139-73-0
6-Heptene-2,4-diol, 4-(2-propenyl)-	101536-75-8
6-Heptene-2,4-diol, 5,5-dimethyl-	98753-77-6
6-Heptene-2,5-diol, 4,6-dimethyl-	134876-94-1
6-Heptene-2,5-diol, 5-ethenyl-4-methyl-	65757-31-5
1,3-Octanediol, 2-methylene-	108086-78-8
1,6-Octadiene-3,5-diol, 2,6-dimethyl-	91140-06-6
1,6-Octadiene-3,5-diol, 3,7-dimethyl-	75654-19-2
1,7-Octadiene-3,6-diol, 2,6-dimethyl-	51276-33-6
1,7-Octadiene-3,6-diol, 2,7-dimethyl-	26947-10-4
1,7-Octadiene-3,6-diol, 3,6-dimethyl-	31354-73-1
1-Octene-3,6-diol, 3-ethenyl-	65757-34-8
2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-	162648-63-7
2,4-Octadiene-1,7-diol, 3,7-dimethyl-	136054-24-5
2,5-Octadiene-1,7-diol, 2,6-dimethyl-	91140-07-7
2,5-Octadiene-1,7-diol, 3,7-dimethyl-	117935-59-8
2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol)	101391-01-9
2,6-Octadiene-1,8-diol, 2-methyl-	149112-02-7
2,7-Octadiene-1,4-diol, 3,7-dimethyl-	91140-08-8
2,7-Octadiene-1,5-diol, 2,6-dimethyl-	91140-09-9
2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool)	103619-06-3
2,7-Octadiene-1,6-diol, 2,7-dimethyl-	60250-14-8
2-Octene-1,4-diol	40735-15-7
2-Octene-1,7-diol	73842-95-2
2-Octene-1,7-diol, 2-methyl-6-methylene-	91140-16-8
3,5-Octadiene-1,7-diol, 3,7-dimethyl-	62875-09-6
3,5-Octadiene-2,7-diol, 2,7-dimethyl-	7177-18-6
3,5-Octanediol, 4-methylene-	143233-15-2
3,7-Octadiene-1,6-di 1, 2,6-dimethyl-	127446-29-1
3,7-Octadiene-2,5-diol, 2,7-dimethyl-	171436-39-8
3,7-Octadiene-2,6-diol, 2,6-dimethyl-	150283-67-3
3-Octene-1,5-diol, 4-methyl-	147028-43-1

3-Octene-1,5-diol, 5-methyl-	19764-77-3
4,6-Octadiene-1,3-diol, 2,2-dimethyl-	39824-01-6
4,7-Octadiene-2,3-diol, 2,6-dimethyl-	51117-38-5
4,7-Octadiene-2,6-diol, 2,6-dimethyl-	59076-71-0
4-Octene-1,6-diol, 7-methyl-	84538-24-9
4-Octene-1,8-diol, 2,7-bis(methylene)-	109750-56-3
4-Octene-1,8-diol, 2-methylene-	109750-58-5
5,7-Octadiene-1,4-diol, 2,7-dimethyl-	105676-78-6
5,7-Octadiene-1,4-diol, 7-methyl-	105676-80-0
5-Octene-1,3-diol	130272-38-7
6-Octene-1,3-diol, 7-methyl-	110971-19-2
6-Octene-1,4-diol, 7-methyl-	152715-87-2
6-Octene-1,5-diol	145623-79-6
6-Octene-1,5-diol, 7-methyl-	116214-61-0
6-Octene-3,5-diol, 2-methyl-	65534-66-9
6-Octene-3,5-diol, 4-methyl-	156414-25-4
7-Octene-1,3-diol, 2-methyl-	155295-38-8
7-Octene-1,3-diol, 4-methyl-	142459-25-4
7-Octene-1,3-diol, 7-methyl-	132130-96-2
7-Octene-1,5-diol	7310-51-2
7-Octene-1,6-diol	159099-43-1
7-Octene-1,6-diol, 5-methyl-	144880-56-8
7-Octene-2,4-diol, 2-methyl-6-methylene-	72446-81-2
7-Octene-2,5-diol, 7-methyl-	152344-12-2
7-Octene-3,5-diol, 2-methyl-	98753-85-6
1-Nonene-3,5-diol	119554-56-2
1-Nonene-3,7-diol	23866-97-9
3-Nonene-2,5-diol	165746-84-9
4,6-Nonadiene-1,3-diol, 8-methyl-	124099-52-1
4-Nonene-2,8-diol	154600-80-3
6,8-Nonadiene-1,5-diol	108586-03-4
7-Nonene-2,4-diol	30625-41-3
8-Nonene-2,4-diol	119785-59-0
8-Nonene-2,5-diol	132381-58-9
1,9-Decadiene-3,8-diol	103984-04-9
1,9-Decadiene-4,6-diol	138835-67-3

Preferred Unsaturated Diols

1,3-Butanediol, 2,2-diallyl-	103985-49-5
1,3-Butanediol, 2-(1-ethyl-1-propenyl)-	116103-35-6
1,3-Butanediol, 2-(2-butenyl)-2-methyl-	92207-83-5
1,3-Butanediol, 2-(3-methyl-2-butenyl)-	98955-19-2
1,3-Butanediol, 2-ethyl-2-(2-propenyl)-	122761-93-7
1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-	141585-58-2
1,4-Butanediol, 2,3-bis(1-methylethylidene)-	52127-63-6

<i>1,3-Pentanediol, 2-ethenyl-3-ethyl-</i>	<i>104683-37-6</i>
<i>1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-</i>	<i>143447-08-9</i>
<i>1,4-Pentanediol, 3-methyl-2-(2-propenyl)-</i>	<i>139301-86-3</i>
<i>4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-</i>	<i>109788-04-7</i>
<i>4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-</i>	<i>90676-97-4</i>
<i>1,4-Hexanediol, 4-ethyl-2-methylene-</i>	<i>66950-87-6</i>
<i>1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-</i>	<i>18984-03-7</i>
<i>1,5-Hexanediol, 2-(1-methylethenyl)-</i>	<i>96802-18-5</i>
<i>2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-</i>	<i>70101-76-7</i>
<i>1,4-Heptanediol, 6-methyl-5-methylene-</i>	<i>100590-29-2</i>
<i>2,4-Heptadiene-2,6-diol, 4,6-dimethyl-</i>	<i>102605-95-8</i>
<i>2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-</i>	<i>115346-30-0</i>
<i>2-Heptene-1,4-diol, 5,6-dimethyl-</i>	<i>103867-76-1</i>
<i>3-Heptene-1,5-diol, 4,6-dimethyl-</i>	<i>147028-45-3</i>
<i>5-Heptene-1,3-diol, 2,4-dimethyl-</i>	<i>123363-69-9</i>
<i>5-Heptene-1,3-diol, 3,6-dimethyl-</i>	<i>96924-52-6</i>
<i>5-Heptene-1,4-diol, 2,6-dimethyl-</i>	<i>106777-98-4</i>
<i>5-Heptene-1,4-diol, 3,6-dimethyl-</i>	<i>106777-99-5</i>
<i>6-Heptene-1,3-diol, 2,2-dimethyl-</i>	<i>140192-39-8</i>
<i>6-Heptene-1,4-diol, 5,6-dimethyl-</i>	<i>152344-16-6</i>
<i>6-Heptene-1,5-diol, 2,4-dimethyl-</i>	<i>74231-27-9</i>
<i>6-Heptene-1,5-diol, 2-ethylidene-6-methyl-</i>	<i>91139-73-0</i>
<i>6-Heptene-2,4-diol, 4-(2-propenyl)-</i>	<i>101536-75-8</i>
<i>1-Octene-3,6-diol, 3-ethenyl-</i>	<i>65757-34-8</i>
<i>2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-</i>	<i>162648-63-7</i>
<i>2,5-Octadiene-1,7-diol, 2,6-dimethyl-</i>	<i>91140-07-7</i>
<i>2,5-Octadiene-1,7-diol, 3,7-dimethyl-</i>	<i>117935-59-8</i>
<i>2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol)</i>	<i>101391-01-9</i>
<i>2,6-Octadiene-1,8-diol, 2-methyl-</i>	<i>149112-02-7</i>
<i>2,7-Octadiene-1,4-diol, 3,7-dimethyl-</i>	<i>91140-08-8</i>
<i>2,7-Octadiene-1,5-diol, 2,6-dimethyl-</i>	<i>91140-09-9</i>
<i>2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool)</i>	<i>103619-06-3</i>
<i>2,7-Octadiene-1,6-diol, 2,7-dimethyl-</i>	<i>60250-14-8</i>
<i>2-Octene-1,7-diol, 2-methyl-6-methylene-</i>	<i>91140-16-8</i>
<i>3,5-Octadiene-2,7-diol, 2,7-dimethyl-</i>	<i>7177-18-6</i>
<i>3,5-Octanediol, 4-methylene-</i>	<i>143233-15-2</i>
<i>3,7-Octadiene-1,6-diol, 2,6-dimethyl-</i>	<i>127446-29-1</i>
<i>4-Octene-1,8-diol, 2-methylene-</i>	<i>109750-58-5</i>
<i>6-Octene-3,5-diol, 2-methyl-</i>	<i>65534-66-9</i>
<i>6-Octene-3,5-diol, 4-methyl-</i>	<i>156414-25-4</i>
<i>7-Octene-2,4-diol, 2-methyl-6-methylene-</i>	<i>72446-81-2</i>
<i>7-Octene-2,5-diol, 7-methyl-</i>	<i>152344-12-2</i>
<i>7-Octene-3,5-diol, 2-methyl-</i>	<i>98753-85-6</i>

<i>1-Nonene-3,5-diol</i>	<i>119554-56-2</i>
<i>1-Nonene-3,7-diol</i>	<i>23866-97-9</i>
<i>3-Nonene-2,5-diol</i>	<i>165746-84-9</i>
<i>4-Nonene-2,8-diol</i>	<i>154600-80-3</i>
<i>6,8-Nonadiene-1,5-diol</i>	<i>108586-03-4</i>
<i>7-Nonene-2,4-diol</i>	<i>30625-41-3</i>
<i>8-Nonene-2,4-diol</i>	<i>119785-59-0</i>
<i>8-Nonene-2,5-diol</i>	<i>132381-58-9</i>
<i>1,9-Decadiene-3,8-diol</i>	<i>103984-04-9</i>
<i>1,9-Decadiene-4,6-diol</i>	<i>138835-67-3</i>

; and

XI. mixtures thereof.

There are no C₁₋₂ mono-ols that provide the clear concentrated fabric softener compositions of this invention. Only one C₃ mono-ol, n-propanol, provides acceptable performance (forms a clear product and either keeps it clear to a temperature of about 4°C, or allows it to recover upon rewarming to room temperature), although its boiling point (BP) is undesirably low. Of the C₄ mono-ols, only 2-butanol and 2-methyl-2-propanol provide very good performance, but 2-methyl-2-propanol has a BP that is undesirably low. There are no C₅₋₆ mono-ols that provide clear products except for unsaturated mono-ols as described above and hereinafter.

It is found that some principal solvents which have two hydroxyl groups in their chemical formulas are suitable for use in the formulation of the liquid concentrated, clear fabric softener compositions of this invention. It is discovered that the suitability of each principal solvent is surprisingly very selective, dependent on the number of carbon atoms, the isomeric configuration of the molecules having the same number of carbon atoms, the degree of unsaturation, etc. Principal solvents with similar solubility characteristics to the principal solvents above and possessing at least some asymmetry will provide the same benefit. It is discovered that the suitable principal solvents have a ClogP of from about 0.15 to about 0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60.

For example, for the 1,2-alkanediol principal solvent series having the general formula HO-CH₂-CHOH-(CH₂)_n-H, with n being from 1 to 8, only 1,2-hexanediol (n=4), which has a ClogP value of about 0.53, which is within the effective ClogP range of from about 0.15 to about 0.64, is a good principal solvent, and is within the claim of this invention, while the others, e.g., 1,2-propanediol, 1,2-butanediol, 1,2-pentanediol, 1,2-octanediol, 1,2-decanediol, having ClogP values outside the effective 0.15 - 0.64 range, are not. Furthermore, of the hexanediol isomers, again, the 1,2-hexanediol is a good principal solvent, while many other isomers such as 1,3-

hexanediol, 1,4-hexanediol, 1,5-hexanediol, 1,6-hexanediol, 2,4-hexanediol, and 2,5-hexanediol, having ClogP values outside the effective 0.15 - 0.64 range, are not. These are illustrated by the Examples and Comparative Examples I-A and I-B (vide *infra*).

There are no C₃-C₅ diols that provide a clear concentrated composition in the context of this invention.

Although there are many C₆ diols that are possible isomers, only the ones listed above are suitable for making clear products and only: 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and 1,2-hexanediol are preferred, of which the most preferred are: 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and 1,2-hexanediol.

There are more possible C₇ diol isomers, but only the listed ones provide clear products and the preferred ones are: 1,3-butanediol, 2-butyl-; 1,4-butanediol, 2-propyl-; 1,5-pentanediol, 2-ethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; 1,6-heptanediol; of which the most preferred are: 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; and 3,4-pentanediol, 2,3-dimethyl-.

Similarly, there are even more C₈ diol isomers, but only the listed ones provide clear products and the preferred ones are: 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol,

2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol of which the following are the most preferred: 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-

propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-

heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol.

Preferred mixtures of eight-carbon-atom-1,3 diols can be formed by the condensation of mixtures of butyraldehyde, isobutyraldehyde and/or methyl ethyl ketone (2-butanone), so long as there are at least two of these reactants in the reaction mixture, in the presence of highly alkaline catalyst followed by conversion by hydrogenation to form a mixture of eight-carbon-1,3-diols, i.e., a mixture of 8-carbon-1,3-diols primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2-dimethyl-2,4-hexanediol; 2-methyl-3,5-heptanediol; and/or 3-methyl-3,5-heptanediol, the level of 2,2,4-trimethyl-1,3-pentanediol being less than half of any mixture, possibly along with other minor isomers resulting from condensation on the methylene group of 2-butanone, when it is present, instead of on the methyl group.

The formulatability, and other properties, such as odor, fluidity, melting point lowering, etc., of some C₆₋₈ diols listed above in Tables II-IV which are not preferred, can be improved by polyalkoxylation. Also, some of the C₃₋₅ diols which are alkoxyated are preferred. Preferred alkoxyated derivatives of the above C₃₋₈ diols [In the following disclosure, "EO" means polyethoxylates, "E_n" means - (CH₂CH₂O)_nH; Me-E_n means methyl-capped polyethoxylates -(CH₂CH₂O)_nCH₃; "2(Me-E_n)" means 2 Me-E_n groups needed; "PO" means polypropoxylates, - (CH(CH₃)CH₂O)_nH; "BO" means polybutyleneoxy groups, (CH(CH₂CH₃)CH₂O)_nH; and "n-BO" means poly(n-butyleneoxy) groups - (CH₂CH₂CH₂CH₂O)_nH.] include:

1. 1,2-propanediol (C3) 2(Me-E₃₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₈₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,3-propanediol (C3) 2(Me-E₈); 1,3-propanediol (C3) PO₆; 1,3-propanediol, 2,2-diethyl- (C7) E₄₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₄₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₄₋₇; 1,3-pr panediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₉₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5)

PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₄₋₅); 1,3-propanediol, 2-methyl- (C4) PO₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₆₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₂₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₄₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂;

2. 1,2-butanediol (C4) (Me E₆₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₅₋₆); 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₄₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₃; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₃; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₃; 1,3-butanediol, 2-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₆₋₈; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₂₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₃₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₆₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₂₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-2-methyl-

(C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂; 1,4-butanediol, 2-isopropyl- (C7) E₄₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₂; 1,4-butanediol, 2-methyl- (C5) (Me E₉₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-propyl- (C7) E₂₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₆₋₈; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₂₋₃; 2,3-butanediol (C4) (Me E₉₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol, 2,3-dimethyl- (C6) E₇₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) BO₂₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₂₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₇₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2-ethyl- (C7) E₆₋₈; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2-methyl- (C6) (Me-E₄₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-

pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,5-pentanediol, (C5) (Me-E₈₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2-ethyl- (C7) E₂₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₄₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₂; 2,3-pentanediol, 3-methyl- (C6) E₄₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₂; 2,3-pentanediol, 4-methyl- (C6) E₄₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₂; 2,4-pentanediol, (C5) 2(Me-E₂₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₈₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₈₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₂₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₆₋₈; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 3-methyl- (C7) E₆₋₈; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 4-methyl- (C7) E₆₋₈; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 5-methyl- (C7) E₆₋₈; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol (C6) (Me-E₂₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₆₋₈; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 3-methyl- (C7) E₆₋₈; 1,4-

hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 4-methyl- (C7) E₆₋₈; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 5-methyl- (C7) E₆₋₈; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol (C6) (Me-E₂₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₆₋₈; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 3-methyl- (C7) E₆₋₈; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 4-methyl- (C7) E₆₋₈; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 5-methyl- (C7) E₆₋₈; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₂₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁; 1,6-hexanediol, 3-methyl- (C7) E₂₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁; 2,3-hexanediol (C6) E₂₋₅; 2,3-hexanediol (C6) n-BO₁; 2,4-hexanediol (C6) (Me-E₅₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₅₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₂₋₅; 3,4-hexanediol (C6) n-BO₁;

5. 1,3-heptanediol (C7) E₃₋₆; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₂; 1,4-heptanediol (C7) E₃₋₆; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₂; 1,5-heptanediol (C7) E₃₋₆; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₂; 1,6-heptanediol (C7) E₃₋₆; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₇₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₇₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₇₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₇₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol,

2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl-

(C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof.

Of the nonane isomers, only 2,4-pentadiol, 2,3,3,4-tetramethyl- is highly preferred.

In addition to the aliphatic diol principal solvents, and some of their alkoxyated derivatives, discussed hereinbefore and hereinafter, some specific diol ethers are also found to be suitable principal solvents for the formulation of liquid concentrated, clear fabric softener compositions of the present invention. Similar to the aliphatic diol principal solvents, it is discovered that the suitability of each principal solvent is very selective, depending, e.g., on the number of carbon atoms in the specific diol ether molecules. For example, as given in Table VI, for the glyceryl ether series having the formula HOCH₂-CHOH-CH₂-O-R, wherein R is from C₂ to C₈ alkyl, only monopentyl ethers with the formula HOCH₂-CHOH-CH₂-O-C₅H₁₁ (3-pentyloxy-1,2-propanediol), wherein the C₅H₁₁ group comprises different pentyl isomers, have ClogP values within the preferred ClogP values of from about 0.25 to about 0.62 and are suitable for the formulation of liquid concentrated, clear fabric softeners of the present invention. These are illustrated by the Examples and Comparative Examples XXXIIA-7 to XXXIIA-7F. It is also found that the cyclohexyl derivative, but not the cyclopentyl derivative, is suitable. Similarly, selectivity is exhibited in the selection of aryl glyceryl ethers. Of the many possible aromatic groups, only a few phenol derivatives are suitable.

The same narrow selectivity is also found for the di(hydroxyalkyl) ethers. It is discovered that bis(2-hydroxybutyl) ether, but not bis(2-hydroxypentyl) ether, is suitable. For the di(cyclic hydroxyalkyl) analogs, the bis(2-hydroxycyclopentyl) ether is suitable, but not the bis(2-hydroxycyclohexyl) ether. Non-limiting examples of synthesis methods for the preparation of some preferred di(hydroxyalkyl) ethers are given hereinafter.

The butyl monoglycerol ether (also named 3-butyloxy-1,2-propanediol) is not well suited to form liquid concentrated, clear fabric softeners of the present invention. However, its polyethoxylated derivatives, preferably from about

triethoxylated to about nonaethoxylated, more preferably from pentaethoxylated to octaethoxylated, are suitable principal solvents, as given in Table VI.

All of the preferred alkyl glyceryl ethers and/or di(hydroxyalkyl)ethers that have been identified are given in Table VI and the most preferred are: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monoproxyloxy; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxyloxy; and/or 1,2-propanediol, 3-(butyloxy)-, tributyleneoxyloxy. Preferred aromatic glyceryl ethers include: 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; and mixtures thereof. The more preferred aromatic glyceryl ethers include: 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-(2-phenylethyloxy)-; and mixtures thereof. The most preferred di(hydroxyalkyl)ethers include: bis(2-hydroxybutyl)ether; and bis(2-hydroxycyclopentyl)ether;

An illustrative and non-limiting example of synthesis methods to prepare the preferred alkyl and aryl monoglyceryl ethers is given hereinafter.

The alicyclic diols and their derivatives that are preferred include: (1) the saturated diols and their derivatives including: 1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-

Abstract

cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; and/or 1,2-cyclohexanediol, dibutylenoxylate.

Preferred aromatic diols include: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; and/or 1-phenyl-1,4-butanediol, of which, 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; and/or 1-phenyl-1,4-butanediol are the most preferred.

As discussed hereinbefore, all of the unsaturated materials that are related to the other preferred principal solvents herein by the same relationship, i.e., having one more CH₂ group than the corresponding saturated principal solvent and remaining within the effective ClogP range are preferred. However, the specific preferred unsaturated diol principal solvents are: 1,3-butanediol, 2,2-diallyl-; 1,3-butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-butanediol, 2-(2-butenyl)-2-methyl-; 1,3-butanediol, 2-(3-methyl-2-butenyl)-; 1,3-butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-butanediol, 2,3-bis(1-methylethylidene)-; 1,3-pentanediol, 2-ethenyl-3-ethyl-; 1,3-pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-pentanediol, 3-methyl-2-(2-propenyl)-; 4-pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-hexanediol, 4-ethyl-2-methylene-; 1,5-hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-hexanediol, 2-(1-methylethenyl)-; 2-hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 1,4-heptanediol, 6-methyl-5-methylene-; 2,4-heptadiene-2,6-diol, 4,6-dimethyl-; 2,6-heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-heptene-1,4-diol, 5,6-dimethyl-; 3-heptene-1,5-diol, 4,6-dimethyl-; 5-heptene-1,3-diol, 2,4-dimethyl-; 5-heptene-1,3-diol, 3,6-dimethyl-; 5-heptene-1,4-diol, 2,6-dimethyl-; 5-heptene-1,4-diol, 3,6-dimethyl-; 6-heptene-1,3-diol, 2,2-dimethyl-; 6-heptene-1,4-diol, 5,6-dimethyl-; 6-heptene-1,5-diol, 2,4-dimethyl-; 6-heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-heptene-2,4-diol, 4-(2-propenyl)-; 1-octene-3,6-diol, 3-ethenyl-; 2,4,6-octatriene-1,8-diol, 2,7-dimethyl-; 2,5-octadiene-1,7-diol, 2,6-dimethyl-; 2,5-octadiene-1,7-diol, 3,7-dimethyl-; 2,6-octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-octadiene-1,8-diol, 2-methyl-; 2,7-octadiene-1,4-diol, 3,7-dimethyl-; 2,7-octadiene-1,5-diol, 2,6-dimethyl-; 2,7-octadiene-1,6-diol, 2,6-dimethyl- (8-hydroxylinalool); 2,7-octadiene-1,6-diol, 2,7-dimethyl-; 2-octene-1,7-diol, 2-methyl-6-methylene-; 3,5-octadiene-2,7-diol, 2,7-dimethyl-; 3,5-octanediol, 4-methylene-; 3,7-octadiene-1,6-diol, 2,6-dimethyl-; 4-octene-1,8-diol, 2-methylene-; 6-octene-3,5-diol, 2-methyl-; 6-octene-3,5-diol, 4-methyl-; 7-octene-2,4-diol, 2-

methyl-6-methylene-; 7-octene-2,5-diol, 7-methyl-; 7-octene-3,5-diol, 2-methyl-; 1-nonene-3,5-diol; 1-nonene-3,7-diol; 3-nonene-2,5-diol; 4-nonene-2,8-diol; 6,8-nonadiene-1,5-diol; 7-nonene-2,4-diol; 8-nonene-2,4-diol; 8-nonene-2,5-diol; 1,9-decadiene-3,8-diol; and/or 1,9-decadiene-4,6-diol.

Said principal alcohol solvent can also preferably be selected from the group consisting of: 2,5-dimethyl-2,5-hexanediol; 2-ethyl-1,3-hexanediol; 2-methyl-2-propyl-1,3-propanediol; 1,2-hexanediol; and mixtures thereof. More preferably said principal alcohol solvent is selected from the group consisting of 2-ethyl-1,3-hexanediol; 2-methyl-2-propyl-1,3-propanediol; 1,2-hexanediol; and mixtures thereof. Even more preferably, said principal alcohol solvent is selected from the groups consisting of 2-ethyl-1,3-hexanediol; 1,2-hexanediol; and mixtures thereof.

When several derivatives of the same diol with different alkyleneoxy groups can be used, e.g., 2-methyl-2,3-butanediol having 3 to 5 ethyleneoxy groups, or 2 propyleneoxy groups, or 1 butyleneoxy group, it is preferred to use the derivative with the lowest number of groups, i.e., in this case, the derivative with one butyleneoxy group. However, when only about one to about four ethyleneoxy groups are needed to provide good formulatability, such derivatives are also preferred.

UNSATURATED DIOLS

It is found surprisingly that there is a clear similarity between the acceptability (formulatability) of a saturated diol and its unsaturated homologs, or analogs, having higher molecular weights. The unsaturated homologs/analog have the same formulatability as the parent saturated principal solvent with the condition that the unsaturated principal solvents have one additional methylene (viz., CH_2) group for each double bond in the chemical formula. In other words, there is an apparent "addition rule" in that for each good saturated principal solvent of this invention, which is suitable for the formulation of clear, concentrated fabric softener compositions, there are suitable unsaturated principal solvents where one, or more, CH_2 groups are added while, for each CH_2 group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen atoms in the molecule constant with respect to the chemical formula of the "parent" saturated principal solvent. This is due to a surprising fact that adding a $-\text{CH}_2-$ group to a solvent chemical formula has an effect of increasing its ClogP value by about 0.53, while removing two adjacent hydrogen atoms to form a double bond has an effect of decreasing its ClogP value by about a similar amount, viz., about 0.48, thus about compensating for the $-\text{CH}_2-$ addition. Therefore one goes from a preferred saturated principal solvent to

the preferred higher molecular weight unsaturated analogs/homologs containing at least one more carbon atom by inserting one double bond for each additional CH₂ group, and thus the total number of hydrogen atoms is kept the same as in the parent saturated principal solvent, as long as the ClogP value of the new solvent remains within the effective 0.15-0.64, preferably from about 0.25 to about 0.62, and more preferably from about 0.40 to about 0.60, range. The following are some illustrative examples:

2,2-Dimethyl-6-heptene-1,3-diol (CAS No. 140192-39-8) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-methyl-1,3-heptanediol or 2,2-dimethyl-1,3-hexanediol.

2,4-Dimethyl-5-heptene-1,3-diol (CAS No. 123363-69-9) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-methyl-1,3-heptanediol or 2,4-dimethyl-1,3-hexanediol.

2-(1-Ethyl-1-propenyl)-1,3-butanediol (CAS No. 116103-35-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 2-(1-ethylpropyl)-1,3-propanediol or 2-(1-methylpropyl)-1,3-butanediol.

2-Ethenyl-3-ethyl-1,3-pentanediol (CAS No. 104683-37-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to either of the following preferred C₈-diol principal solvents: 3-ethyl-2-methyl-1,3-pentanediol or 2-ethyl-3-methyl-1,3-pentanediol.

3,6-Dimethyl-5-heptene-1,4-diol (e.g., CAS No. 106777-99-5) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 3-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; or 3,5-dimethyl-1,4-hexanediol.

5,6-Dimethyl-6-heptene-1,4-diol (e.g., CAS No. 152344-16-6) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 5-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; or 4,5-dimethyl-1,3-hexanediol.

4-Methyl-6-octene-3,5-diol (CAS No. 156414-25-4) is a preferred C₉-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C₈-diol principal solvents: 3,5-octanediol, 3-methyl-2,4-heptanediol or 4-methyl-3,5-heptanediol.

Rosiridol (CAS No. 101391-01-9) and isorosiridol (CAS No. 149252-15-3) are two isomers of 3,7-dimethyl-2,6-octadiene-1,4-diol, and are preferred C10-diol principal solvents. They can be considered to be derived by appropriately adding two CH₂ groups and two double bonds to any of the following preferred C8-diol principal solvents: 2-methyl-1,3-heptanediol; 6-methyl-1,3-heptanediol; 3-methyl-1,4-heptanediol; 6-methyl-1,4-heptanediol; 2,5-dimethyl-1,3-hexanediol; or 3,5-dimethyl-1,4-hexanediol.

8-Hydroxylinalool (CAS No. 103619-06-3, 2,6-dimethyl-2,7-octadiene-1,6-diol) is a preferred C10-diol principal solvent and can be considered to be derived by appropriately adding two CH₂ groups and two double bonds to any of the following preferred C8-diol principal solvents: 2-methyl-1,5-heptanediol; 5-methyl-1,5-heptanediol; 2-methyl-1,6-heptanediol; 6-methyl-1,6-heptanediol; or 2,4-dimethyl-1,4-hexanediol.

2,7-Dimethyl-3,7-octadiene-2,5-diol (CAS No. 171436-39-8) is a preferred C10-diol principal solvent and can be considered to be derived by appropriately adding two CH₂ group and two double bond to any of the following preferred C8-diol principal solvents: 2,5-octanediol; 6-methyl-1,4-heptanediol; 2-methyl-2,4-heptanediol; 6-methyl-2,4-heptanediol; 2-methyl-2,5-heptanediol; 6-methyl-2,5-heptanediol; and 2,5-dimethyl-2,4-hexanediol.

4-Butyl-2-butene-1,4-diol (CAS No. 153943-66-9) is a preferred C8-diol principal solvent and can be considered to be derived by appropriately adding a CH₂ group and a double bond to any of the following preferred C7-diol principal solvents: 2-propyl-1,4-butanediol or 2-butyl-1,3-propanediol.

By the same token, there are cases where a higher molecular weight unsaturated homolog which is derived from a poor, inoperable saturated solvent is itself a poor solvent. For example, 3,5-dimethyl-5-hexene-2,4-diol (e.g., CAS No. 160429-40-3) is a poor unsaturated C8 solvent, and can be considered to be derived from the following poor saturated C7 solvents: 3-methyl-2,4-hexanediol; 5-methyl-2,4-hexanediol; or 2,4-dimethyl-1,3-pentanediol; and 2,6-dimethyl-5-heptene-1,2-diol (e.g., CAS No. 141505-71-7) is a poor unsaturated C9 solvent, and can be considered to be derived from the following poor saturated C8 solvents: 2-methyl-1,2-heptanediol; 6-methyl-1,2-heptanediol; or 2,5-dimethyl-1,2-hexanediol.

It is also found, surprisingly, that there is an exception to the above addition rule, in which saturated principal solvents always have unsaturated analogs/homologs with the same degree of acceptability. The exception relates to saturated diol principal solvents having the two hydroxyl groups situated on two adjacent carbon atoms. In some cases, but not always, inserting one, or more, CH₂ groups between

the two adjacent hydroxyl groups of a poor solvent results in a higher molecular weight unsaturated homolog which is more suitable for the clear, concentrated fabric softener formulation. For example, the preferred unsaturated 6,6-dimethyl-1-heptene-3,5-diol (CAS No. 109788-01-4) having no adjacent hydroxyl groups can be considered to be derived from the inoperable 2,2-dimethyl-3,4-hexanediol which has adjacent hydroxyl groups. In this case, it is more reliable to consider that the 6,6-dimethyl-1-heptene-3,5-diol is derived from either 2-methyl-3,5-heptanediol or 5,5-dimethyl-2,4-hexanediol which are both preferred principal solvents and do not have adjacent hydroxyl groups. Conversely, inserting CH₂ groups between the adjacent hydroxyl groups of a preferred principal solvent can result in an inoperable higher molecular weight unsaturated diol solvent. For example, the inoperable unsaturated 2,4-dimethyl-5-hexene-2,4-diol (CAS No. 87604-24-8) having no adjacent hydroxyl groups can be considered to be derived from the preferred 2,3-dimethyl-2,3-pentanediol which has adjacent hydroxyl groups. In this case, it is more reliably to derive the inoperable unsaturated 2,4-dimethyl-5-hexene-2,4-diol from either 2-methyl-2,4-hexanediol or 4-methyl-2,4-hexanediol which are both inoperable solvents and do not have adjacent hydroxyl groups. There are also cases where an inoperable unsaturated solvent having no adjacent hydroxyl groups can be considered to be derived from an inoperable solvent which has adjacent hydroxyl groups, such as the pair 4,5-dimethyl-6-hexene-1,3-diol and 3,4-dimethyl-1,2-pentanediol. Therefore, in order to deduce the formulatability of an unsaturated solvent having no adjacent hydroxyl groups, one should start from a low molecular weight saturated homolog also not having adjacent hydroxyl groups. I.e., in general, the relationship is more reliable when the distance/relationship of the two hydroxy groups is maintained. I.e., it is reliable to start from a saturated solvent with adjacent hydroxyl groups to deduce the formulatability of the higher molecular weight unsaturated homologs also having adjacent hydroxyl groups.

It has been discovered that the use of these specific principal alcohol solvents can produce clear, low viscosity, stable fabric softener compositions at surprisingly low principal solvent levels, i.e., less than about 40%, by weight of the composition. It has also been discovered that the use of the principal alcohol solvents can produce highly concentrated fabric softener compositions, that are stable and can be diluted, e.g. from about 2:1 to about 10:1, to produce compositions with lower levels of fabric softener that are still stable.

As previously discussed, the principal solvents are desirably kept to the lowest levels that are feasible in the present compositions for obtaining translucency or clarity. The presence of water exerts an important effect on the need for the

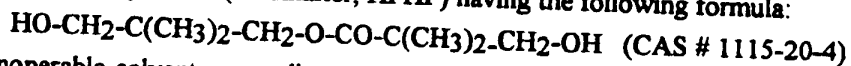
principal solvents to achieve clarity of these compositions. The higher the water content, the higher the principal solvent level (relative to the softener level) is needed to attain product clarity. Inversely, the less the water content, the less principal solvent (relative to the softener) is needed. Thus, at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is preferably from about 55:45 to about 85:15, more preferably from about 60:40 to about 80:20. At water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is preferably from about 45:55 to about 70:30, more preferably from about 55:45 to about 70:30. But at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is preferably from about 30:70 to about 55:45, more preferably from about 35:65 to about 45:55. At even higher water levels, the softener to principal solvent ratios should also be even higher.

Mixtures of the above principal solvents are particularly preferred, since one of the problems associated with large amounts of solvents is safety. Mixtures decrease the amount of any one material that is present. Odor and flammability can also be minimized by use of mixtures, especially when one of the principal solvents is volatile and/or has an odor, which is more likely for low molecular weight materials. Suitable solvents that can be used at levels that would not be sufficient to produce a clear product are 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethyl-1,3-hexanediol. For the purposes of this invention, these solvents should only be used at levels that will not provide a stable, or clear product. Preferred mixtures are those where the majority of the solvent is one, or more, that have been identified hereinbefore as most preferred. The use of mixtures of solvents is also preferred, especially when one, or more, of the preferred principal solvents are solid at room temperature. In this case, the mixtures are fluid, or have lower melting points, thus improving processability of the softener compositions.

It is also discovered that it is possible to substitute for part of a principal solvent or a mixture of principal solvents of this invention with a secondary solvent, or a mixture of secondary solvents, which by themselves are not operable as a principal solvent of this invention, as long as an effective amount of the operable principal solvent(s) of this invention is still present in the liquid concentrated, clear fabric softener composition. An effective amount of the principal solvent(s) of this invention is at least greater than about 5%, preferably more than about 7%, more preferably more than about 10% of the composition, when at least about 15% of the softener active is also present. The substitute solvent(s) can be used at any level, but

preferably about equal to, or less than, the amount of operable principal solvent, as defined hereinbefore, that is present in the fabric softener composition.

For example, even though 1,2-pentanediol, 1,3-octanediol, and hydroxy pivalyl hydroxy pivalate (hereinafter, HPHP) having the following formula:



are inoperable solvents according to this invention, mixtures of these solvents with the principal solvent, e.g., with the preferred 1,2-hexanediol principal solvent, wherein the 1,2-hexanediol principal solvent is present at effective levels, also provide liquid concentrated, clear fabric softener compositions.

Some of the secondary solvents that can be used are those listed as inoperable hereinbefore and hereinafter, as well as some parent, non-alkoxylated solvents disclosed in Tables VIIIA-VIIIE.

The principal solvent can be used to either make a composition translucent or clear, or can be used to reduce the temperature at which the composition is translucent or clear. Thus the invention also comprises the method of adding the principal solvent, at the previously indicated levels, to a composition that is not translucent, or clear, or which has a temperature where instability occurs that is too high, to make the composition translucent or clear, or, when the composition is clear, e.g., at ambient temperature, or down to a specific temperature, to reduce the temperature at which instability occurs, preferably by at least about 5°C, more preferably by at least about 10°C. The principal advantage of the principal solvent is that it provides the maximum advantage for a given weight of solvent. It is understood that "solvent", as used herein, refers to the effect of the principal solvent and not to its physical form at a given temperature, since some of the principal solvents are solids at ambient temperature.

Alkyl Lactates

Some alkyl lactate esters, e.g., ethyl lactate and isopropyl lactate have ClogP values within the effective range of from about 0.15 to about 0.64, and can form liquid concentrated, clear fabric softener compositions with the fabric softener actives of this invention, but need to be used at a slightly higher level than the more effective diol solvents like 1,2-hexanediol. They can also be used to substitute for part of other principal solvents of this invention to form liquid concentrated, clear fabric softener compositions. This is illustrated in Example I-C.

NOVEL COMPOUNDS

Several of the above principal solvents are novel compounds including: 1,2-butanediol, 2,3,3-trimethyl-, 3,4-pentanediol, 2,3-dimethyl-, 2,3-hexanediol, 4-methyl-, 2,3-hexanediol, 5-methyl-, 3,4-hexanediol, 2-methyl-, 3,4-pentanediol, 2,3-

dimethyl-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 4-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 5-methyl-; 2,4-heptanediol, 5-methyl-; 2,5-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 2,6-octanediol; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; 2,5-hexanediol, 3,3,5-trimethyl-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(isoamyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-;

1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-1-oxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; bis(2-hydroxybutyl) ether; and bis(2-hydroxycyclopentyl) ether.

Similarly, the unsaturated analogs of the operable principal solvents are novel, especially the unsaturated C₇₋₁₂ diols, more preferably unsaturated C₈₋₁₀ diols, with the exception of the specifically mentioned unsaturated diols listed above in Table IX. These principal solvents all provide the unobvious benefit described hereinbefore.

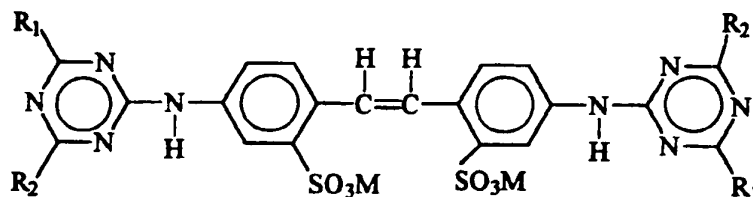
III. OPTIONAL INGREDIENTS

(A) Low molecular weight water soluble solvents can also be used at levels of from 0% to about 12%, preferably from about 1% to about 10%, more preferably from about 2% to about 8%. The water soluble solvents cannot provide a clear product at the same low levels of the principal solvents described hereinbefore but can provide clear product when the principal solvent is not sufficient to provide completely clear product. The presence of these water soluble solvents is therefore highly desirable. Such solvents include: ethanol; isopropanol; 1,2-propanediol; 1,3-propanediol; propylene carbonate; etc. but do not include any of the principal solvents (B). These water soluble solvents have a greater affinity for water in the presence of hydrophobic materials like the softener active than the principal solvents.

(B) Brighteners

The compositions herein can also optionally contain from about 0.005% to 5% by weight of certain types of hydrophilic optical brighteners which also provide a dye transfer inhibition action. If used, the compositions herein will preferably comprise from about 0.001% to 1% by weight of such optical brighteners.

The hydrophilic optical brighteners useful in the present invention are those having the structural formula:



wherein R₁ is selected from anilino, N-2-bis-hydroxyethyl and NH-2-hydroxyethyl;
R₂ is selected from N-2-bis-hydroxyethyl, N-2-hydroxyethyl-N-methylamino,

morphilino, chloro and amino; and M is a salt-forming cation such as sodium or potassium.

When in the above formula, R₁ is anilino, R₂ is N-2-bis-hydroxyethyl and M is a cation such as sodium, the brightener is 4,4',-bis[(4-anilino-6-(N-2-bis-hydroxyethyl)-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid and disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal-UNPA-GX® by Ciba-Geigy Corporation. Tinopal-UNPA-GX is the preferred hydrophilic optical brightener useful in the rinse added compositions herein.

When in the above formula, R₁ is anilino, R₂ is N-2-hydroxyethyl-N-2-methylamino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-(N-2-hydroxyethyl-N-methylamino)-s-triazine-2-yl)amino]2,2'-stilbenedisulfonic acid disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal 5BM-GX® by Ciba-Geigy Corporation.

When in the above formula, R₁ is anilino, R₂ is morphilino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-morphilino-s-triazine-2-yl)amino]2,2'-stilbenedisulfonic acid, sodium salt. This particular brightener species is commercially marketed under the tradename Tinopal AMS-GX® by Ciba Geigy Corporation.

(C) Dispersibility Aids

(J) Optional Viscosity/Dispersibility Modifiers

Relatively concentrated compositions containing both saturated and unsaturated diester quaternary ammonium compounds can be prepared that are stable without the addition of concentration aids. However, the compositions of the present invention may require organic and/or inorganic concentration aids to go to even higher concentrations and/or to meet higher stability standards depending on the other ingredients. These concentration aids which typically can be viscosity modifiers may be needed, or preferred, for ensuring stability under extreme conditions when particular softener active levels are used. The surfactant concentration aids are typically selected from the group consisting of (1) single long chain alkyl cationic surfactants; (2) nonionic surfactants; (3) amine oxides; (4) fatty acids; and (5) mixtures thereof. These aids are described in P&G Copending Application Serial No. 08/461,207, filed June 5, 1995, Wahl et al., specifically on page 14, line 12 to page 20, line 12, which is herein incorporated by reference.

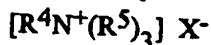
When said dispersibility aids are present, the total level is from about 2% to about 25%, preferably from about 3% to about 17%, more preferably from about 4% to about 15%, and even more preferably from 5% to about 13% by weight of the composition. These materials can either be added as part of the active softener raw

material, (I), e.g., the mono-long chain alkyl cationic surfactant and/or the fatty acid which are reactants used to form the biodegradable fabric softener active as discussed hereinbefore, or added as a separate component. The total level of dispersibility aid includes any amount that may be present as part of component (I).

(1) Mono-Alkyl Cationic Quaternary Ammonium Compound

When the mono-alkyl cationic quaternary ammonium compound is present, it is typically present at a level of from about 2% to about 25%, preferably from about 3% to about 17%, more preferably from about 4% to about 15%, and even more preferably from 5% to about 13% by weight of the composition, the total mono-alkyl cationic quaternary ammonium compound being at least at an effective level.

Such mono-alkyl cationic quaternary ammonium compounds useful in the present invention are, preferably, quaternary ammonium salts of the general formula:



wherein

R^4 is C_8 - C_{22} alkyl or alkenyl group, preferably C_{10} - C_{18} alkyl or alkenyl group; more preferably C_{10} - C_{14} or C_{16} - C_{18} alkyl or alkenyl group;

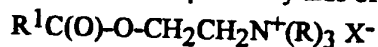
each R^5 is a C_1 - C_6 alkyl or substituted alkyl group (e.g., hydroxy alkyl), preferably C_1 - C_3 alkyl group, e.g., methyl (most preferred), ethyl, propyl, and the like, a benzyl group, hydrogen, a polyethoxylated chain with from about 2 to about 20 oxyethylene units, preferably from about 2.5 to about 13 oxyethylene units, more preferably from about 3 to about 10 oxyethylene units, and mixtures thereof; and

X^- is as defined hereinbefore for (Formula (I)).

Especially preferred dispersibility aids are monolauryl trimethyl ammonium chloride and monotallow trimethyl ammonium chloride available from Witco under the trade name Varisoft® 471 and monooleyl trimethyl ammonium chloride available from Witco under the tradename Varisoft® 417.

The R^4 group can also be attached to the cationic nitrogen atom through a group containing one, or more, ester, amide, ether, amine, etc., linking groups which can be desirable for increased concentratability of component (I), etc. Such linking groups are preferably within from about one to about three carbon atoms of the nitrogen atom.

Mono-alkyl cationic quaternary ammonium compounds also include C_8 - C_{22} alkyl choline esters. The preferred dispersibility aids of this type have the formula:



wherein R^1 , R and X^- are as defined previously.

Highly preferred dispersibility aids include C_{12} - C_{14} coco choline ester and C_{16} - C_{18} tallow choline ester.

Suitable biodegradable single-long-chain alkyl dispersibility aids containing an ester linkage in the long chains are described in U.S. Pat. No. 4,840,738, Hardy and Walley, issued June 20, 1989, said patent being incorporated herein by reference.

When the dispersibility aid comprises alkyl choline esters, preferably the compositions also contain a small amount, preferably from about 2% to about 5% by weight of the composition, of organic acid. Organic acids are described in European Patent Application No. 404,471, Machin et al., published on Dec. 27, 1990, *supra*, which is herein incorporated by reference. Preferably the organic acid is selected from the group consisting of glycolic acid, acetic acid, citric acid, and mixtures thereof.

Ethoxylated quaternary ammonium compounds which can serve as the dispersibility aid include ethylbis(polyethoxy ethanol)alkylammonium ethyl-sulfate with 17 moles of ethylene oxide, available under the trade name Variquat® 66 from Sherex Chemical Company; polyethylene glycol (15) oleammonium chloride, available under the trade name Ethoquad® 0/25 from Akzo; and polyethylene glycol (15) cocomonium chloride, available under the trade name Ethoquad® C/25 from Akzo.

Although the main function of the dispersibility aid is to increase the dispersibility of the ester softener, preferably the dispersibility aids of the present invention also have some softening properties to boost softening performance of the composition. Therefore, preferably the compositions of the present invention are essentially free of non-nitrogenous ethoxylated nonionic dispersibility aids which will decrease the overall softening performance of the compositions.

Also, quaternary compounds having only a single long alkyl chain, can protect the cationic softener from interacting with anionic surfactants and/or detergent builders that are carried over into the rinse from the wash solution.

(2) Amine Oxides

Suitable amine oxides include those with one alkyl or hydroxyalkyl moiety of about 8 to about 22 carbon atoms, preferably from about 10 to about 18 carbon atoms, more preferably from about 8 to about 14 carbon atoms, and two alkyl moieties selected from the group consisting of alkyl groups and hydroxyalkyl groups with about 1 to about 3 carbon atoms.

Examples include dimethyloctylamine oxide, diethyldodecylamine oxide, bis-(2-hydroxyethyl)dodecyl-amin oxide, dimethyldodecylamine oxide, dipropyl-tetradecylamine oxide, methylethylhexadecylamine oxide, dimethyl-2-hydroxyoctadecylamine oxide, and coconut fatty alkyl dimethylamine oxide.

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(D) Stabilizers

Stabilizers can be present in the compositions of the present invention. The term "stabilizer," as used herein, includes antioxidants and reductive agents. These agents are present at a level of from 0% to about 2%, preferably from about 0.01% to about 0.2%, more preferably from about 0.035% to about 0.1% for antioxidants, and more preferably from about 0.01% to about 0.2% for reductive agents. These assure good odor stability under long term storage conditions. Antioxidants and reductive agent stabilizers are especially critical for unscented or low scent products (no or low perfume).

Examples of antioxidants that can be added to the compositions of this invention include a mixture of ascorbic acid, ascorbic palmitate, propyl gallate, available from Eastman Chemical Products, Inc., under the trade names Tenox® PG and Tenox® S-1; a mixture of BHT (butylated hydroxytoluene), BHA (butylated hydroxyanisole), propyl gallate, and citric acid, available from Eastman Chemical Products, Inc., under the trade name Tenox®-6; butylated hydroxytoluene, available from UOP Process Division under the trade name Sustane® BHT; tertiary butylhydroquinone, Eastman Chemical Products, Inc., as Tenox® TBHQ; natural tocopherols, Eastman Chemical Products, Inc., as Tenox® GT-1/GT-2; and butylated hydroxyanisole, Eastman Chemical Products, Inc., as BHA; long chain esters (C₈-C₂₂) of gallic acid, e.g., dodecyl gallate; Irganox® 1010; Irganox® 1035; Irganox® B 1171; Irganox® 1425; Irganox® 3114; Irganox® 3125; and mixtures thereof, preferably Irganox® 3125, Irganox® 1425, Irganox® 3114, and mixtures thereof, more preferably Irganox® 3125 alone or mixed with citric acid and/or other chelators such as isopropyl citrate, Dequest® 2010, available from Monsanto with a chemical name of 1-hydroxyethylidene-1, 1-diphosphonic acid (etidronic acid), and Tiron®, available from Kodak with a chemical name of 4,5-dihydroxy-m-benzene-sulfonic acid/sodium salt, and DTPA®, available from Aldrich with a chemical name of diethylenetriaminepentaacetic acid.

The chemical names and CAS numbers for some of the above stabilizers which can be used in the compositions of the present invention are listed in Table I below.

(E) Soil Release Agent

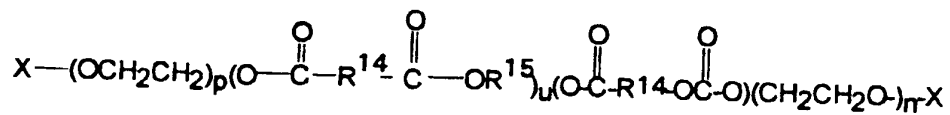
In the present invention, an optional soil release agent can be added. The addition of the soil release agent can occur in combination with the premix, in combination with the acid/water seat, before or after electrolyte addition, or after the final composition is made. The softening composition prepared by the process of the present invention herein can contain from 0% to about 10%, preferably from 0.2% to about 5%, of a soil release agent. Preferably, such a soil release agent is a polymer.

Polymeric soil release agents useful in the present invention include copolymeric blocks of terephthalate and polyethylene oxide or polypropylene oxide, and the like.

A preferred soil release agent is a copolymer having blocks of terephthalate and polyethylene oxide. More specifically, these polymers are comprised of repeating units of ethylene terephthalate and polyethylene oxide terephthalate at a molar ratio of ethylene terephthalate units to polyethylene oxide terephthalate units of from 25:75 to about 35:65, said polyethylene oxide terephthalate containing polyethylene oxide blocks having molecular weights of from about 300 to about 2000. The molecular weight of this polymeric soil release agent is in the range of from about 5,000 to about 55,000.

Another preferred polymeric soil release agent is a crystallizable polyester with repeat units of ethylene terephthalate units containing from about 10% to about 15% by weight of ethylene terephthalate units together with from about 10% to about 50% by weight of polyoxyethylene terephthalate units, derived from a polyoxyethylene glycol of average molecular weight of from about 300 to about 6,000, and the molar ratio of ethylene terephthalate units to polyoxyethylene terephthalate units in the crystallizable polymeric compound is between 2:1 and 6:1. Examples of this polymer include the commercially available materials Zelcon 4780® (from Dupont) and Milease T® (from ICI).

Highly preferred soil release agents are polymers of the generic formula:



in which each X can be a suitable capping group, with each X typically being selected from the group consisting of H, and alkyl or acyl groups containing from about 1 to about 4 carbon atoms. p is selected for water solubility and generally is from about 6 to about 113, preferably from about 20 to about 50. u is critical to formulation in a liquid composition having a relatively high ionic strength. There should be very little material in which u is greater than 10. Furthermore, there should be at least 20%, preferably at least 40%, of material in which u ranges from about 3 to about 5.

The R¹⁴ moieties are essentially 1,4-phenylene moieties. As used herein, the term "the R¹⁴ moieties are essentially 1,4-phenylene moieties" refers to compounds where the R¹⁴ moieties consist entirely of 1,4-phenylene moieties, or are partially substituted with other arylene or alkarylene moieties, alkenyl moieties, alkenylene moieties, or mixtures thereof. Arylene and alkarylene moieties which can be partially substituted for 1,4-phenylene include 1,3-phenylene, 1,2-phenylene, 1,8-naphthylene,

1,4-naphthylene, 2,2-biphenylene, 4,4-biphenylene, and mixtures thereof. Alkylene and alkenylene moieties which can be partially substituted include 1,2-propylene, 1,4-butylene, 1,5-pentylene, 1,6-hexamethylene, 1,7-heptamethylene, 1,8-octamethylene, 1,4-cyclohexylene, and mixtures thereof.

For the R^{14} moieties, the degree of partial substitution with moieties other than 1,4-phenylene should be such that the soil release properties of the compound are not adversely affected to any great extent. Generally the degree of partial substitution which can be tolerated will depend upon the backbone length of the compound, i.e., longer backbones can have greater partial substitution for 1,4-phenylene moieties. Usually, compounds where the R^{14} comprise from about 50% to about 100% 1,4-phenylene moieties (from 0% to about 50% moieties other than 1,4-phenylene) have adequate soil release activity. For example, polyesters made according to the present invention with a 40:60 mole ratio of isophthalic (1,3-phenylene) to terephthalic (1,4-phenylene) acid have adequate soil release activity. However, because most polyesters used in fiber making comprise ethylene terephthalate units, it is usually desirable to minimize the degree of partial substitution with moieties other than 1,4-phenylene for best soil release activity. Preferably, the R^{14} moieties consist entirely of (i.e., comprise 100%) 1,4-phenylene moieties, i.e., each R^{14} moiety is 1,4-phenylene.

For the R^{15} moieties, suitable ethylene or substituted ethylene moieties include ethylene, 1,2-propylene, 1,2-butylene, 1,2-hexylene, 3-methoxy-1,2-propylene, and mixtures thereof. Preferably, the R^{15} moieties are essentially ethylene moieties, 1,2-propylene moieties, or mixtures thereof. Inclusion of a greater percentage of ethylene moieties tends to improve the soil release activity of compounds. Surprisingly, inclusion of a greater percentage of 1,2-propylene moieties tends to improve the water solubility of compounds.

Therefore, the use of 1,2-propylene moieties or a similar branched equivalent is desirable for incorporation of any substantial part of the soil release component in the liquid fabric softener compositions. Preferably, from about 75% to about 100%, are 1,2-propylene moieties.

The value for each p is at least about 6, and preferably is at least about 10. The value for each n usually ranges from about 12 to about 113. Typically the value for each p is in the range from about 12 to about 43.

A more complete disclosure of soil release agents is contained in U.S. Pat. Nos.: 4,661,267, Decker, Konig, Straathof, and Gosselink, issued Apr. 28, 1987; 4,711,730, Gosselink and Diehl, issued Dec. 8, 1987; 4,749,596, Evans, Huntington, Stewart, Wolf, and Zimmerer, issued June 7, 1988; 4,818,569, Trinh, Gosselink, and

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Rattinger, issued April 4, 1989; 4,877,896, Maldonado, Trinh, and Gosselink, issued Oct. 31, 1989; 4,956,447, Gosselink et al., issues Sept. 11, 1990; and 4,976,879, Maldonado, Trinh, and Gosselink, issued Dec. 11, 1990, all of said patents being incorporated herein by reference.

These soil release agents can also act as scum dispersants.

(F) Scum Dispersant

In the present invention, the premix can be combined with an optional scum dispersant, other than the soil release agent, and heated to a temperature at or above the melting point(s) of the components.

The preferred scum dispersants herein are formed by highly ethoxylating hydrophobic materials. The hydrophobic material can be a fatty alcohol, fatty acid, fatty amine, fatty acid amide, amine oxide, quaternary ammonium compound, or the hydrophobic moieties used to form soil release polymers. The preferred scum dispersants are highly ethoxylated, e.g., more than about 17, preferably more than about 25, more preferably more than about 40, moles of ethylene oxide per molecule on the average, with the polyethylene oxide portion being from about 76% to about 97%, preferably from about 81% to about 94%, of the total molecular weight.

The level of scum dispersant is sufficient to keep the scum at an acceptable, preferably unnoticeable to the consumer, level under the conditions of use, but not enough to adversely affect softening. For some purposes it is desirable that the scum is nonexistent. Depending on the amount of anionic or nonionic detergent, etc., used in the wash cycle of a typical laundering process, the efficiency of the rinsing steps prior to the introduction of the compositions herein, and the water hardness, the amount of anionic or nonionic detergent surfactant and detergency builder (especially phosphates and zeolites) entrapped in the fabric (laundry) will vary. Normally, the minimum amount of scum dispersant should be used to avoid adversely affecting softening properties. Typically scum dispersion requires at least about 2%, preferably at least about 4% (at least 6% and preferably at least 10% for maximum scum avoidance) based upon the level of softener active. However, at levels of about 10% (relative to the softener material) or more, one risks loss of softening efficacy of the product especially when the fabrics contain high proportions of nonionic surfactant which has been absorbed during the washing operation.

Preferred scum dispersants are: Brij 700®; Varonic U-250®; Genapol T-500®, Genapol T-800®, Plurafac A-79®, and Neodol 25-50®.

(G) Bactericides

Examples of bactericides used in the compositions of this invention include glutaraldehyde, formaldehyde, 2-br mo-2-nitro-propane-1,3-diol sold by Inolex

Chemicals, located in Philadelphia, Pennsylvania, under the trade name Bronopol®, and a mixture of 5-chloro-2-methyl-4-isothiazoline-3-one and 2-methyl-4-isothiazoline-3-one sold by Rohm and Haas Company under the trade name Kathon about 1 to about 1,000 ppm by weight of the agent.

(H) Perfume

The present invention can contain any softener compatible perfume. Suitable perfumes are disclosed in U.S. Pat. 5,500,138, Bacon et al., issued March 19, 1996, said patent being incorporated herein by reference.

As used herein, perfume includes fragrant substance or mixture of substances including natural (i.e., obtained by extraction of flowers, herbs, leaves, roots, barks, wood, blossoms or plants), artificial (i.e., a mixture of different nature oils or oil constituents) and synthetic (i.e., synthetically produced) odoriferous substances. Such materials are often accompanied by auxiliary materials, such as fixatives, extenders, stabilizers and solvents. These auxiliaries are also included within the meaning of "perfume", as used herein. Typically, perfumes are complex mixtures of a plurality of organic compounds.

Examples of perfume ingredients useful in the perfumes of the present invention compositions include, but are not limited to, hexyl cinnamic aldehyde; amyl cinnamic aldehyde; amyl salicylate; hexyl salicylate; terpineol; 3,7-dimethyl-*cis*-2,6-octadien-1-ol; 2,6-dimethyl-2-octanol; 2,6-dimethyl-7-octen-2-ol; 3,7-dimethyl-3-octanol; 3,7-dimethyl-*trans*-2,6-octadien-1-ol; 3,7-dimethyl-6-octen-1-ol; 3,7-dimethyl-1-octanol; 2-methyl-3-(para-tert-butylphenyl)-propionaldehyde; 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde; tricyclodecenyl propionate; tricyclodecenyl acetate; anisaldehyde; 2-methyl-2-(para-iso-propylphenyl)-propionaldehyde; ethyl-3-methyl-3-phenyl glycidate; 4-(para-hydroxyphenyl)-butan-2-one; 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one; para-methoxyacetophenone; para-methoxy-alpha-phenylpropene; methyl-2-n-hexyl-3-oxo-cyclopentane carboxylate; undecalactone gamma.

Additional examples of fragrance materials include, but are not limited to, orange oil; lemon oil; grapefruit oil; bergamot oil; clove oil; dodecalactone gamma; methyl-2-(2-pentyl-3-oxo-cyclopentyl) acetate; beta-naphthol methylether; methyl-beta-naphthylketone; coumarin; decylaldehyde; benzaldehyde; 4-tert-butylcyclohexyl acetate; alpha, alpha-dimethylphenethyl acetate; methylphenylcarbonyl acetate; Schiff's base of 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate; cyclic ethyleneglycol diester of tridecandioic acid; 3,7-dimethyl-2,6-octadiene-1-

nitrile; ionone gamma methyl; ionone alpha; ionone beta; petitgrain; methyl cedrylone; 7-acetyl-1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethyl-naphthalene; ionone methyl; methyl-1,6,10-trimethyl-2,5,9-cyclododecatrien-1-yl ketone; 7-acetyl-1,1,3,4,4,6-hexamethyl tetralin; 4-acetyl-6-tert-butyl-1,1-dimethyl indane; benzophenone; 6-acetyl-1,1,2,3,3,5-hexamethyl indane; 5-acetyl-3-isopropyl-1,1,2,6-tetramethyl indane; 1-dodecanal; 7-hydroxy-3,7-dimethyl octanal; 10-undecen-1-al; iso-hexenyl cyclohexyl carboxaldehyde; formyl tricyclodecan; cyclopentadecanolide; 16-hydroxy-9-hexadecenoic acid lactone; 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-gamma-2-benzopyrane; ambroxane; dodecahydro-3a,6,6,9a-tetramethylnaphtho-[2,1b]furan; cedrol; 5-(2,2,3-trimethylcyclopent-3-enyl)-3-methylpentan-2-ol; 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol; caryophyllene alcohol; cedryl acetate; para-tert-butylcyclohexyl acetate; patchouli; olibanum resinoid; labdanum; vetivert; copaiba balsam; fir balsam; and condensation products of: hydroxycitronellal and methyl anthranilate; hydroxycitronellal and indol; phenyl acetaldehyde and indol; 4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate.

More examples of perfume components are geraniol; geranyl acetate; linalool; linalyl acetate; tetrahydrolinalool; citronellol; citronellyl acetate; dihydromyrcenol; dihydromyrcenyl acetate; tetrahydromyrcenol; terpinyl acetate; nopol; nopyl acetate; 2-phenylethanol; 2-phenylethyl acetate; benzyl alcohol; benzyl acetate; benzyl salicylate; benzyl benzoate; styrallyl acetate; dimethylbenzylcarbinol; trichloromethylphenylcarbiny methylphenylcarbiny acetate; isononyl acetate; vetiveryl acetate; vetiverol; 2-methyl-3-(p-tert-butylphenyl)-propanal; 2-methyl-3-(p-isopropylphenyl)-propanal; 3-(p-tert-butylphenyl)-propanal; 4-(4-methyl-3-pentenyl)-3-cyclohexenecarbaldehyde; 4-acetoxy-3-pentyltetrahydropyran; methyl dihydrojasmonate; 2-n-heptylcyclopentanone; 3-methyl-2-pentyl-cyclopentanone; n-decanal; n-dodecanal; 9-decenol-1; phenoxyethyl isobutyrate; phenylacetaldehyde dimethylacetal; phenylacetaldehyde diethylacetal; geranonitrile; citronellonitrile; cedryl acetal; 3-isocamphylcyclohexanol; cedryl methylether; isolongifolanone; aubepine nitrile; aubepine; heliotropine; eugenol; vanillin; diphenyl oxide; hydroxycitronellal ionones; methyl ionones; isomethyl ionomes; irones; cis-3-hexenol and esters thereof; indane musk fragrances; tetralin musk fragrances; isochroman musk fragrances; macrocyclic ketones; macrolactone musk fragrances; ethylene brassylate.

The perfumes useful in the present invention compositions are substantially free of halogenated materials and nitromusks.

Suitable solvents, diluents or carriers for perfumes ingredients mentioned above are for examples, ethanol, isopropanol, diethylene glycol, monoethyl ether, dipropylene glycol, diethyl phthalate, triethyl citrate, etc. The amount of such solvents, diluents or carriers incorporated in the perfumes is preferably kept to the minimum needed to provide a homogeneous perfume solution.

Perfume can be present at a level of from 0% to about 10%, preferably from about 0.1% to about 5%, and more preferably from about 0.2% to about 3%, by weight of the finished composition. Fabric softener compositions of the present invention provide improved fabric perfume deposition.

(I) Chelating Agents

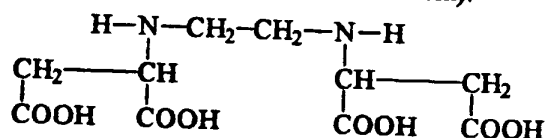
The compositions and processes herein can optionally employ one or more copper and/or nickel chelating agents ("chelators"). Such water-soluble chelating agents can be selected from the group consisting of amino carboxylates, amino phosphonates, polyfunctionally-substituted aromatic chelating agents and mixtures thereof, all as hereinafter defined. The whiteness and/or brightness of fabrics are substantially improved or restored by such chelating agents and the stability of the materials in the compositions are improved.

Amino carboxylates useful as chelating agents herein include ethylenediaminetetraacetates (EDTA), N-hydroxyethylethylenediaminetriacetates, nitrilotriacetates (NTA), ethylenediamine tetrapropionates, ethylenediamine-N,N'-diglutamates, 2-hydroxypropylenediamine-N,N'-disuccinates, triethylenetetraamine-hexacetates, diethylenetriaminepentaacetates (DETPA), and ethanoldiglycines, including their water-soluble salts such as the alkali metal, ammonium, and substituted ammonium salts thereof and mixtures thereof.

Amino phosphonates are also suitable for use as chelating agents in the compositions of the invention when at least low levels of total phosphorus are permitted in detergent compositions, and include ethylenediaminetetrakis (methylenephosphonates), diethylenetriamine-N,N,N',N'',N''-pentakis(methane phosphonate) (DETMP) and 1-hydroxyethane-1,1-diphosphonate (HEDP). Preferably, these amino phosphonates do not contain alkyl or alkenyl groups with more than about 6 carbon atoms.

The chelating agents are typically used in the present rinse process at levels from about 2 ppm to about 25 ppm, for periods from 1 minute up to several hours' soaking.

The preferred EDDS chelator used herein (also known as ethylenediamine-N,N'-disuccinate) is the material described in U.S. Patent 4,704,233, cited hereinabove, and has the formula (shown in free acid form):



As disclosed in the patent, EDDS can be prepared using maleic anhydride and ethylenediamine. The preferred biodegradable [S,S] isomer of EDDS can be prepared by reacting L-aspartic acid with 1,2-dibromoethane. The EDDS has advantages over other chelators in that it is effective for chelating both copper and nickel cations, is available in a biodegradable form, and does not contain phosphorus. The EDDS employed herein as a chelator is typically in its salt form, i.e., wherein one or more of the four acidic hydrogens are replaced by a water-soluble cation M, such as sodium, potassium, ammonium, triethanolammonium, and the like. As noted before, the EDDS chelator is also typically used in the present rinse process at levels from about 2 ppm to about 25 ppm for periods from 1 minute up to several hours' soaking. At certain pH's the EDDS is preferably used in combination with zinc cations.

A wide variety of chelators can be used herein. Indeed, simple polycarboxylates such as citrate, oxydisuccinate, and the like, can also be used, although such chelators are not as effective as the amino carboxylates and phosphonates, on a weight basis. Accordingly, usage levels may be adjusted to take into account differing degrees of chelating effectiveness. The chelators herein will preferably have a stability constant (of the fully ionized chelator) for copper ions of at least about 5, preferably at least about 7. Typically, the chelators will comprise from about 0.5% to about 10%, more preferably from about 0.75% to about 5%, by weight of the compositions herein, in addition to those that are stabilizers. Preferred chelators include DETMP, DETPA, NTA, EDDS and mixtures thereof.

(J) Other Optional Ingredients

The present invention can include optional components conventionally used in textile treatment compositions, for example: colorants; preservatives; surfactants; anti-shrinkage agents; fabric crisping agents; spotting agents; germicides; fungicides; anti-oxidants such as butylated hydroxy toluene, anti-corrosion agents, and the like.

Particularly preferred ingredients include water soluble calcium and/or magnesium compounds, which provide additional stability. The chloride salts are preferred, but acetate, nitrate, etc. salts can be used. The level of said calcium and/or

magnesium salts is from 0% to about 2%, preferably from about 0.05% to about 0.5%, more preferably from about 0.1% to about 0.25%.

The present invention can also include other compatible ingredients, including those as disclosed in copending applications Serial Nos.: 08/372,068, filed January 12, 1995, Rusche, et al.; 08/372,490, filed January 12, 1995, Shaw, et al.; and 08/277,558, filed July 19, 1994, Hartman, et al., incorporated herein by reference.

PREPARATION OF PRINCIPAL SOLVENTS PREPARATION OF DIOL PRINCIPAL SOLVENTS

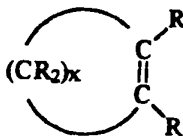
Many synthesis methods can be used to prepare the diol principal solvents of this invention. The appropriate method is selected for each specific structural requirement of each principal solvent. Furthermore, most principal solvents can also be prepared by more than one method. Therefore, the methods cited herein for each specific principal solvent are for illustrative purposes only and should not be considered as limiting.

METHOD A

Preparation of 1,5-, 1,6-, and 1,7-Diols

Method 1

This synthesis method is a general preparation of α,ω -type diols derived from substituted cyclic alkenes. Examples of cyclic alkenes are the alkylated isomers of cyclopentene, cyclohexene, and cycloheptene. The general formula of useful alkylated cyclic alkenes is



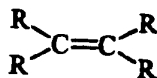
wherein each R is H, or C₁-C₄-alkyl, and where x is 3, 4, or 5.

Cyclic alkenes may be converted to the terminal diols by a three step reaction sequence.

Step 1 is the reaction of the cyclic alkene with ozone (O₃) in a solvent such as anhydrous ethyl acetate to form the intermediate ozonide. In Step 2 the ozonide is reduced by, e.g., palladium catalyst /H₂ to the dialdehyde which is then converted in Step 3 to the target diol by borohydride reduction.

The 1,2- diols are generally prepared by direct hydroxylation of the appropriate substituted olefins. Example:

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wherein each R is H, alkyl, etc.

In a typical reaction the alkene is reacted with hydrogen peroxide (30%) and a catalytic amount of osmium tetroxide in t-butyl alcohol or other suitable solvent. The reaction is cooled to about 0°C and allowed to run overnight. Unreacted compounds and solvent are removed by distillation and the desired 1,2- diol isolated by distillation or crystallization.

Method 2 An alternate method is the conversion of the olefin to the epoxide by the reaction of m-chloroperbenzoic acid, or peracetic acid, in a solvent such as methylene chloride at temperatures below about 25°C. The epoxide generated by this chemistry is then opened to the diol by, e.g., hydrolysis with dilute sulfuric acid.

Step 3 to the target diol by borohydride reduction.

Method 3

An alternate method for the preparation of these compounds is by direct hydroxylation of the cyclic alkene with hydrogen peroxide and a catalytic amount of osmium tetroxide. The reaction yields the cyclic diol which is then converted to the open chain dialdehyde by periodate or lead tetraacetate. The dialdehyde is then reduced with borohydride as in Method 1, to give the desired 1,5- or 1,6- diols, etc.

METHOD B

Preparation of 1,2 Diols

Method 1

METHOD C

Preparation of 1,3-Diols

Acylation of Enamines

This preparation is for the general type of 1,3-diols and accommodates a variety of structural features. Enamines are formed from both ketones and aldehydes which react with acid chlorides to form the acylated product. The acylated amine derivative is hydrolyzed back to its acylated carbonyl compound which is the 1,3-dicarbonyl precursor to the desired 1,3-diol. The diol is generated by borohydride reduction of the 1,3-dicarbonyl compound.

Thus acetaldehyde (aldehydes) may be reacted with a secondary amine, preferably cyclic amines such as pyrrolidine or morpholine, by heating at reflux in a solvent such as toluene and with a catalytic amount of p-toluene sulfonic acid. As the amine reacts (condenses) with the carbonyl compound, water is produced and is removed, e.g., by reflux through a water trap. After the theoretical amount of water has been removed, the reaction mixture is stripped, e.g., under vacuum, to remove

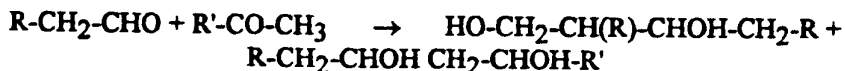
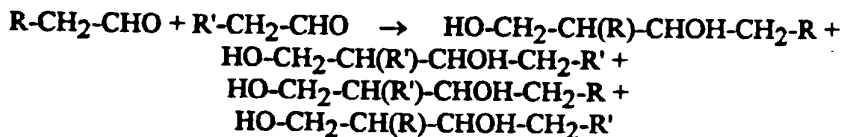
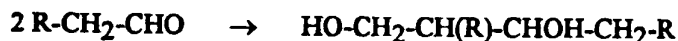
the solvent, if desired (the acylation can be done in the same solvent systems in most cases).

The anhydrous crude enamine containing some excess amine is reacted with the appropriate acid chloride at about 20°C to give the acylated enamine. This reaction is usually allowed to stir overnight at room temperature. The total reaction mixture is then poured over crushed ice, stirred, and the mixture made acidic with 20% HCl. This treatment hydrolyzes the enamine to the acylated dicarbonyl compound. This intermediate is then isolated by extraction and distillation to remove low boiling impurities, then reduced by sodium borohydride to the desired 1,3- diol.

METHOD D

Preparation of 1,4 Diols, by Aldol Condensation and Reduction

The typical reactions involve one or more aldehydes, one or more ketones, and mixtures thereof, which have at least one alpha-hydrogen atom on the carbon atom next to the carbonyl group. Typical examples of some reactants and some potential final products are as follows



The aldehyde, ketone, or mixture thereof which is to be condensed is placed in an autoclave under an inert atmosphere with a solvent such as butanol or with a phase transfer medium such as polyethylene glycol. When a mixed condensation such as with a ketone and an aldehyde is the target, typically the two reactants are used in about 1:1 mole ratio. A catalytic amount of strongly alkaline catalyst such as sodium methoxide is added, typically about 0.5-10 mole% of the reactants. The autoclave is sealed, and the mixture is heated at about 35-100°C until most of the original reactants have been converted, usually about 5 minutes to about 3 hours. The crude mixture is neutralized and the carbonyl functions present are reduced by hydrogenation over Raney Ni at about 100°C and about 50 atm for about 1 hour. Volatile components are removed by distillation and the desired diol principal solvents are obtained by vacuum distillation.

More information about this preparation process is disclosed in Synthesis, (3), 164-5 (1975), A. Pochini and R. Ungaro; PCT Int. Appl. WO 9,507,254, Kulmala et al, 16 Mar. 1995; Japan Pat. Appl. No. 40,333, Sato et al, 9 Feb. 1990; Japan Pat. Appl. No. 299,240, Sato et al, 4 Dec. 1989; Eur. Pat. Appl. No. 367,743, Ankner et al, 9 May 1990; all of said article and patents being incorporated herein by reference.

Illustrative Examples:

Condensation of Butyraldehyde and/or Isobutyraldehyde and Conversion to Form Eight-Carbon-1,3-Diols

A portion of n-butanol (about 148 g, about 2 mole, Aldrich) in a 500 ml, 3-neck, round-bottom flask equipped with a stirring bar, internal thermometer, condenser, and connection for blanketing with a nitrogen atmosphere is treated with sodium metal (about 2.3 g, about 0.1 mole, Aldrich) until the sodium has all dissolved. Then, a mixture of butyraldehyde (about 72 g, about 1 mole, Aldrich) and isobutyraldehyde (about 72 g, about 1 mole, Aldrich) is added and the system is held at about 40°C until most of the original aldehydes have undergone reaction. The base catalyst is neutralized by careful addition of sulfuric acid, any salts are removed by filtration, and the solution is hydrogenated over Raney Ni at about 100°C at about 50 atm of pressure for about 1 hour to yield a mixture of 8-carbon, 1,3-diols. The butanol solvent and any isobutanol formed during the hydrogenation are removed by distillation to yield the eight-carbon-1,3-diol mixture of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; and 2-ethyl-4-methyl-1,3-pentanediol. Optionally, this mixture is further purified by vacuum distillation, or by decolorization with activated charcoal. The recovered solvent is used for further batches of diol production.

When only butyraldehyde is used in the reaction, the major product obtained is 2-ethyl-1,3-hexanediol.

When only isobutyraldehyde is used in the reaction, the major product obtained is 2,2,4-trimethyl-1,3-pentanediol.

Mixed Condensation of Butyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

Condition A. A portion of n-butanol (about 148 g, about 2 mole, Aldrich) in a 500 ml, 3-neck, round-bottom flask equipped with a stirring bar, internal thermometer, condenser, and connection for blanketing with a nitrogen atmosphere is treated with sodium metal (about 2.3 g, about 0.1 mole, Aldrich) until the sodium has all dissolved. Then, a mixture of butyraldehyde (about 72 g, about 1 mole, Aldrich) and 2-butanone (about 72 g, about 1 mole, Aldrich) is added and the system is held at about 40°C until

most of the original butyraldehyde has undergone reaction. The base catalyst is neutralized by careful addition of sulfuric acid and any salts are removed by filtration. Optionally, unreacted starting materials are removed by distillation along with the reaction solvent. The mixture containing the condensation products is hydrogenated over Raney Ni at about 100°C and about 50 atm. for about 1 hour to yield a mixture of 8-carbon-1,3-diols including 2-ethyl-1,3-hexanediol, 2-ethyl-3-methyl-1,3-pentanediol, 3,5-octanediol; 3-methyl-3,5-heptanediol; and lesser amounts of other 1,3-diol isomers, e.g., 3-methyl-2,4-heptanediol and 3,4-dimethyl-2,4-hexanediol. The crude diol mixture can be further purified by fractional distillation.

Condition B. The above reaction is repeated except that about 2 moles of butyraldehyde are used for each one mole of 2-butanone. This results in a reaction product with a higher proportion of diols resulting from self-condensation of the aldehyde (i.e., 2-ethyl-1,3-hexanediol), and from mixed condensation of aldehyde and 2-butanone (e.g., 2-ethyl-3-methyl-1,3-pentanediol and 3,5-octanediol), and a smaller proportion of those diols resulting from self-condensation of 2-butanone (e.g., 3-methyl-3,5-heptanediol and 3,4-dimethyl-2,4-hexanediol).

Condition C. The above condensation is repeated except that about one mole of 2-butanone is placed in the reaction vessel with the solvent and catalyst and about one mole of butyraldehyde is gradually added. Conditions are adjusted such that the self-condensation rate of 2-butanone is slow and the more reactive carbonyl of the aldehyde reacts promptly upon addition. This results in a reaction product with a higher proportion of the diols resulting from the condensation of 2-butanone with butyraldehyde and from self-condensation of 2-butanone and a smaller proportion of the diol resulting from self-condensation of butyraldehyde.

Condition D. The above condensation C. is repeated under low temperature conditions. About 1.0 mole portion of 2-butanone is dissolved in about 5 volumes of dry tetrahydrofuran. The solution is cooled to about -78°C, and about 0.95 mole of potassium hydride is added in portions. After the hydrogen evolution has ceased, the solution is held for about one hour to allow for equilibration to the more stable enolate and then one mole of n-butyraldehyde is added slowly with good stirring while maintaining the temperature at about -78°C. After addition is complete, the solution is allowed to gradually warm to room temperature and is neutralized by careful addition of sulfuric acid. Salts are removed by filtration. Optionally, unreacted starting materials are removed by distillation along with the reaction solvent. The mixture containing the condensation products is hydrogenated over Raney Ni at about 100°C and about 50 atm. for about 1 hour to yield predominantly the diol resulting from the

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condensation of the enolate of 2-butanone with butyraldehyde, 3,5-octanediol. Purification is optionally accomplished by distillation.

Mixed Condensation of Isobutyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

The reaction of Condition A above is repeated except that the butyraldehyde is replaced by isobutyraldehyde. The condensation and reduction proceed analogously, and the final diol products are mainly 2,2,4-trimethyl-1,3-pentanediol; 2,2,3-trimethyl-1,3-pentanediol; 2-methyl-3,5-heptanediol; and 3-methyl-3,5-heptanediol.

Mixed Condensation of Butyraldehyde, Isobutyraldehyde and Methyl Ethyl Ketone and Conversion to Form a Mixture of Eight-Carbon-1,3-Diols

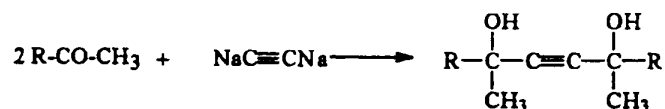
The reaction of Condition A above is repeated, except that about one mole each of butyraldehyde, isobutyraldehyde, and 2-butanone are used. The condensation and reduction proceed analogously to yield a mixture of 8-carbon-1,3-diols primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2,3-trimethyl-1,3-pentanediol; 2-methyl-3,5-heptanediol; and 3-methyl-3,5-heptanediol, along with other minor isomers resulting from condensation on the methylene of 2-butanone instead of the methyl.

The mixtures prepared by the condensation of butyraldehyde, isobutyraldehyde, and/or methyl ethyl ketone, preferably have no more than about 90%, preferably no more than about 80%, more preferably no more than about 70%, even more preferably no more than about 60%, and most preferably no more than about 50%, by weight of any one specific compound. Also, the reaction mixtures should not contain more than about 95%, preferably no more than about 90%, more preferably no more than about 85%, and most preferably no more than about 80%, by weight, of butyraldehyde or isobutyraldehyde.

METHOD E

Preparation of 1,4 Diols, by the Addition of Acetylide to Carbonyl Compounds

Dimetallic acetylides $\text{Na}^+ \text{:C}\equiv\text{C:}^- \text{Na}^+$ react with aldehydes or ketones to form unsaturated alcohols, e.g.,



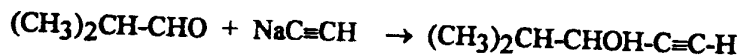
The resulting acetylenic diol is then reduced to the alkene or completely reduced to the saturated diol. The reaction can also be done by using an about 18% slurry of mono-sodium acetylide with the carbonyl compound to form the acetylenic alcohol which can be converted to the sodium salt and reacted with another mole of

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carbonyl compound to give the unsaturated 1,4- diol. Where mixed carbonyl compounds are used with the diacetylides, diol mixtures will result. Where the mono-acetylide is used, specific structures can be made in higher yields.

Illustrative Example: Preparation of 6-Methyl-2,5-heptanediol

A sodium acetylide (about 18% in xylene) slurry is reacted with isobutyraldehyde to form the acetylenic alcohol



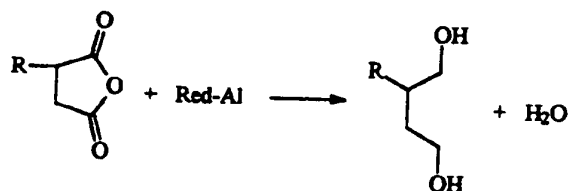
The acetylenic (ethynyl) alcohol is converted with base to the sodium acetylide $\text{R-CHOH-C}\equiv\text{CNa}$ which is then reacted with a mole of acetaldehyde to give the ethynyl diol $\text{R-CHOH-C}\equiv\text{C-CHOH-R'}$. This compound, $(\text{CH}_3)_2\text{CH-CHOH-C}\equiv\text{C-CHOH-CH}_3$, can be isolated as the unsaturated diol, if desired, reduced by catalytic hydrogenation to the corresponding material containing a double bond in place of the acetylenic bond, or further reduced by catalytic hydrogenation to the saturated 1,4- diol.

METHOD F

Preparation of Substituted Diols Derived from Cyclic Anhydrides, Lactones and Esters of Dicarboxylic Acids

This method of preparation is for the synthesis of diols, especially several 1,4-diols, which are derived from dicarboxylic acid anhydrides, diesters and lactones, but not limited to the 1,4-diols or four-carbon diacids.

These types of diols are generally synthesized by the reduction of the parent anhydride, lactone or diester with sodium bis(2-methoxyethoxy)aluminum hydride (Red-Al) as the reducing agent. This reducing agent is commercially available as a 3.1 molar solution in toluene and delivers one mole of hydrogen per mole of reagent. Diesters and cyclic anhydrides require about 3 moles of Red-Al per mole of substrate. Using an alkyl substituted succinic anhydride to illustrate this method, the typical reduction is carried out as follows.



The anhydrid is first dissolved in anhydrous toluene and placed in a reaction vessel equipped with dropping funnel, mechanical stirrer, thermometer and a reflux

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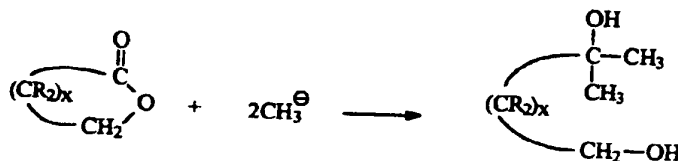
condenser connected to calcium chloride and soda lime tubes to exclude moisture and carbon dioxide. The reducing agent, in toluene, is placed in the dropping funnel and is added slowly to the stirred anhydride solution. The reaction is exothermic and the temperature is allowed to reach about 80°C. It is maintained at about 80°C during the remaining addition time and for about two hours following addition.

The reaction mixture is then allowed to cool back to room temperature. Next, the mixture is added to a stirred aqueous HCl solution (about 20% concentration) which is cooled in an ice bath, and the temperature is maintained at about 20 to 30°C. After acidification the mixture is separated in a separatory funnel and the organic layer washed with a dilute salt solution until neutral to pH paper. The neutral diol solution is dried over anhydrous magnesium sulfate, filtered, then stripped under vacuum to yield the desired 1,4-diol.

METHOD G

Preparation of Diols with One or Both Alcohol Functions Being Secondary or Tertiary

This is a general method to prepare substituted diols from lactones and/or diesters by alkylation of the carboxyl group(s) using methyl magnesium bromide (Grignard reagent) or alkyl lithium compounds usually methyl lithium, e.g.,

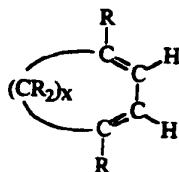


This type of alkylation can be extended to diesters. An excess of methylating reagent will generate diols where both alcohol groups are tertiary.

METHOD H

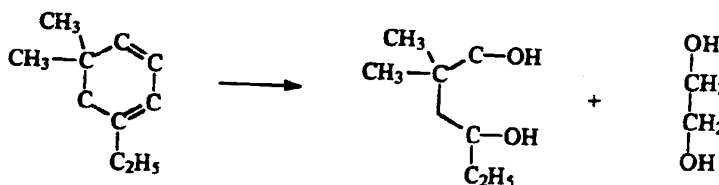
Preparation of Substituted 1,3-, 1,4- and 1,5-Diols

This method is a general preparation of some 1,3-, 1,4- and 1,5-diols which utilizes the chemistry outlined in Method A-1 and Method A-2. The variation here is the use of a cyclic alkadienes in place of the cycloalkenes described in Methods A. The general formula for the starting materials is



wherein each R is H, or C₁-C₄-alkyl and wherein x is 1, 2 or 3.

The reactions are those of Methods A with the variation of having one mole of ethylene glycol generated for each mole of the desired diol principal solvent formed, e.g., the following preparation of 2,2-dimethyl-1,4-hexanediol from 1-ethyl-5,5-dimethyl-1,3-cyclohexanediol (CAS No. 79419-18-4):



PREPARATION OF POLYETHOXYLATED DERIVATIVES

The polyethoxylated derivatives of diol principal solvents are typically prepared in a high-pressure reactor under a nitrogen atmosphere. A suitable amount of ethylene oxide is added to a mixture of a diol solvent and potassium hydroxide at high temperature (from about 80°C to about 170°C). The amount of ethylene oxide is calculated relative to the amount of the diol solvent in order to add the right number of ethylene oxide groups per molecule of diol. When the reaction is completed, e.g., after about 1 hour, residual unreacted ethylene oxide is removed by vacuum.

Illustrative Example: Preparation of Tetraethoxylated 3,3-Dimethyl-1,2-butanediol

To a 2-liter Parr reactor that is equipped for temperature control, is charged with about 354 grams (about 3.0 moles) of 3,3-dimethyl-1,2-butanediol and about 0.54 grams of potassium hydroxide. The reactor is sparged with nitrogen and evacuated three times to a pressure of about 30 mm Hg. The reactor is then filled again with nitrogen to atmospheric pressure, and heated to about 130°C. The pressure of the reactor is then adjusted to slightly below the atmospheric pressure by applying a slight vacuum. Ethylene oxide (about 528 grams, about 12.0 moles) is added over one hour while controlling the temperature to about 130°C. After about an additional one hour reaction time, the contents are cooled to about 90°C and a vacuum is pulled to remove any residual ethylene oxide.

PREPARATION OF METHYL-CAPPED POLYETHOXYLATED DERIVATIVES

Methyl-capped polyethoxylated derivatives of diols are typically prepared either by reacting a methoxypoly(ethoxy)ethyl chloride (i.e., CH₃O-(CH₂CH₂O)_n-

$\text{CH}_2\text{CH}_2\text{-Cl}$) of the desired chain length with the selected diol, or by reacting a methyl-capped polyethylene glycol (i.e., $\text{CH}_3\text{O}-(\text{CH}_2\text{CH}_2\text{O})_n\text{-CH}_2\text{CH}_2\text{-OH}$) of the desired chain length with the epoxy precursor of the diol, or a combination of these methods.

Illustrative Examples: Synthesis of $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}(\text{CH}_3)(\text{OCH}_2\text{CH}_2)_4\text{OCH}_3$, the methyl-capped tetraethoxylated derivative of 2-methyl-2,3-butanediol.

To a 1-liter, three-neck round bottom flask equipped with a magnetic stirbar, condenser, thermometer, and temperature controller (Thermowatch I²R)® is added tetraethylene glycol methyl ether (about 208 grams, about 1.0 mole) and sodium metal (Aldrich, about 2.3 grams, about 0.10 mole), and the mixture is heated to about 100°C under argon. After the sodium dissolves, 2-methyl-2,3-epoxybutane (about 86 grams, about 1.0 mole) is added and the solution is stirred overnight under argon at about 120°C. A ¹³C-NMR (dms_o-d₆) shows that the reaction is complete by the disappearance of the epoxide peaks. The reaction mixture is cooled, poured into an equal volume of water, neutralized with 6 N HCl, saturated with sodium chloride, and extracted twice with dichloromethane. The combined dichloromethane layers are dried over sodium sulfate and solvent is stripped to yield the desired polyether alcohol in crude form. Optionally, purification is accomplished by fractional vacuum distillation.

Synthesis of Methoxytriethoxyethyl Chloride

To a 1-liter, three-neck round bottom flask equipped with a magnetic stirring bar, condenser, and temperature controller (Thermowatch, I²R) is added tetraethylene glycol methyl ether (about 208 grams, about 1.0 mole) under argon. Thionyl chloride (about 256.0 grams, about 2.15 moles) is added dropwise with good stirring over about 3 hours, keeping the temperature in the 50-60°C range. The reaction mixture is then heated overnight at about 55°C. A ¹³C-NMR (D₂O) is taken which shows only a small peak at ~60ppm for unreacted alcohol and a sizable peak at ~43.5ppm representing chlorinated product ($-\text{CH}_2\text{Cl}$). Saturated sodium chloride solution is slowly added to the material until the thionyl chloride is destroyed. The material is taken up in about 300 ml of saturated sodium chloride solution and extracted with about 500 ml of methylene chloride. The organic layer is dried and solvent is stripped on a rotary evaporator to yield crude methoxyethoxyethyl chloride. Optionally, purification is accomplished by fractional vacuum distillation.

Synthesis of $\text{C}_2\text{H}_5\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CH}_2(\text{OCH}_2\text{CH}_2)_4\text{OCH}_3$, the Methyl-Capped Tetraethoxylated Derivative of 2-Methyl-1,3-pentanediol.

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The alcohol, $\text{C}_2\text{H}_5\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$ (about 116 grams, about 1.0 mole), is placed in a 1-liter, three-neck round bottom flask equipped with a magnetic stirring bar, condenser, and temperature controller (Thermowatch®, I²R) along with about 100 ml of tetrahydrofuran as solvent. To this solution, sodium hydride (about 32 grams, about 1.24 moles) is added in portions and the system is held at reflux until gas evolution ceases. Methoxytriethoxyethyl chloride (about 242 grams, about 1.2 moles, prepared as above) is added and the system is held at reflux for about 48 hours. The reaction mixture is cooled to room temperature and water is cautiously added dropwise with stirring to decompose excess hydride. The tetrahydrofuran is stripped off on a rotary evaporator. The crude product is dissolved in about 400 ml of water and enough sodium chloride is dissolved in the water to bring it nearly to the saturation level. The mixture is then extracted twice with about 300 ml portions of dichloromethane. The combined dichloromethane layers are dried over sodium sulfate and the solvent is then stripped on a rotary evaporator to yield the crude product. Optionally, purification is accomplished by further stripping of unreacted starting materials and low MW by-products by utilizing a kugelrohr apparatus at about 150°C under vacuum. Optionally, further purification is accomplished by vacuum distillation to yield the title polyether.

PREPARATION OF POLYPROPOXYLATED DERIVATIVES

A three neck, round bottom flask is equipped with a magnetic stir bar, a solid CO_2 -cooled condenser, an addition funnel, a thermometer, and a temperature control device (Therm-O-Watch, I²R). The system is swept free of air by a stream of nitrogen and then is equipped for blanketing the reaction mixture with a nitrogen atmosphere. To the reaction flask is added the dry alcohol or diol to be propoxylated. About 0.1-5 mole % of sodium metal is added cautiously to the reaction vessel in portions with heating if necessary to get all the sodium to react. The reaction mixture is then heated to about 80-130°C and propylene oxide (Aldrich) is added dropwise from the dropping funnel at a rate to maintain a small amount of reflux from the solid CO_2 -cooled condenser. Addition of propylene oxide is continued until the desired amount has been added for the target degree of propoxylation. Heating is continued until all reflux of propylene oxide ceases and the temperature is maintained for about an additional hour to ensure complete reaction. The reaction mixture is then cooled to room temperature and is neutralized by careful addition of a convenient acid such as methanesulfonic acid. Any salts are removed by filtration to give the desired propoxylated product. The average degree of propoxylation is typically confirmed by integration of the ^1H -NMR spectrum.

PREPARATION OF POLYBUTOXYLATED DERIVATIVES

A three neck, round bottom flask is equipped with a magnetic stir bar, a solid CO₂-cooled condenser, an addition funnel, a thermometer, and a temperature control device (Therm-O-Watch, I2R). The system is swept free of air by a stream of nitrogen and then is equipped for blanketing the reaction mixture with a nitrogen atmosphere. To the reaction flask is added the dry alcohol or diol to be butoxylated. About 0.1-5 mole % of sodium metal is added cautiously to the reaction vessel in portions with heating if necessary to get all the sodium to react. The reaction mixture is then heated to about 80-130°C and α -butylene oxide (Aldrich) is added dropwise from the dropping funnel at a rate to maintain a small amount of reflux from the solid CO₂-cooled condenser. Addition of butylene oxide is continued until the desired amount has been added for the target degree of butoxylation. Heating is continued until all reflux of butylene oxide ceases and the temperature is maintained for about an additional one to two hours to ensure complete reaction. The reaction mixture is then cooled to room temperature and is neutralized by careful addition of a convenient acid such as methanesulfonic acid. Any salts are removed by filtration to give the desired butoxylated product. The average degree of butoxylation is typically confirmed by integration of the ¹H-NMR spectrum.

PREPARATION OF POLYTETRAMETHYLENEOXYLATED DERIVATIVES

A dry portion of about 0.1 mole of the desired alcohol or diol starting material is placed in a 3-neck, round bottom flask equipped with magnetic stirrer, condenser, internal thermometer and an argon blanketing system. If the desired average degree of "tetramethyleneoxylation" is about one per hydroxyl group, about 0.11 moles of 2-(4-chlorobutoxy)tetrahydropyran (ICI) is added per mole of alcohol function. A solvent is added if necessary such as dry tetrahydrofuran, dioxane or dimethylformamide. Then sodium hydride (about 5 mole % excess relative to the chloro compound) is added in small portions with good stirring while maintaining a temperature of about 30-120°C. After all the hydride has reacted, the temperature is maintained until all of the alcohol groups have been alkylated, usually about 4-24 hours. After the reaction is complete, it is cooled and the excess hydride is decomposed by careful addition of methanol in small portions. Then about an equal volume of water is added and the pH is adjusted to about 2 with sulfuric acid. After warming to about 40°C and holding it there for about 15 minutes to hydrolyze the tetrahydropyranyl protecting group, the reaction mixture is neutralized with sodium hydroxide and the solvents are stripped on a rotary evaporator. The residue is taken up in ether or methylene chloride and salts are removed by filtration. Stripping

yields the crude tetramethyleneoxylated alcohol or diol. Further purification may be accomplished by vacuum distillation. If a final average degree of tetramethyleneoxylation of less than one is desired, a correspondingly lesser amount of chloro compound and hydride are used. For average degrees of tetramethyleneoxylation greater than one, the entire process is repeated in cycles until the buildup reaches the target level.

PREPARATION OF ALKYL AND ARYL MONOGLYCERYL ETHERS

A convenient method to prepare alkyl and/or aryl monoglycerol ethers consists of first preparing the corresponding alkyl glycidyl ether precursor. This is then converted to a ketal, which is then hydrolyzed to the monoglyceryl ether (diol). Following is the illustrative example of the preparation of the preferred n-pentyl monoglycerol ether, (i.e., 3-(pentyloxy)-1,2-propanediol) $n\text{-C}_5\text{H}_{11}\text{-O-CHOH-CH}_2\text{OH}$.

Preparation of 3-(pentyloxy)-1,2-propanediol

A 3-neck, 2-liter round bottomed reaction flask (equipped with overhead stirrer, cold water condenser, mercury thermometer and addition funnel) are charged with about 546 g of aqueous NaOH (about 50% concentration) and about 38.5 g of tetrabutylammonium hydrogen sulfate (PTC, phase transfer catalyst). The content of the flask is stirred to achieve dissolution and then about 200 g of 1-pentanol is added along with about 400 ml hexanes (a mixture of isomers, with about 85% n-hexane). Into the addition funnel is charged about 418 g of epichlorohydrin which is slowly added (dropwise) to the stirring reaction mix. The temperature gradually rises to about 68°C due to the reaction exotherm. The reaction is allowed to continue for about 1 hr after complete addition of the epichlorohydrin (no additional heat).

The crude reaction mix is diluted with about 500 ml of warm water, stirred gently and then the aqueous layer is settled and removed. The hexane layer is mixed diluted again with about 1 liter of warm water and the pH of the mix is adjusted to about 6.5 by the addition of dilute aqueous sulfuric acid. The water layer is again separated and discarded and the hexane layer is then washed 3 times with fresh water. The hexane layer is then separated and evaporated to dryness via a rotary evaporator to obtain the crude n-pentyl glycidyl ether.

Acetonation (Conversion to the Ketal)

A 3-neck, 2 liter round bottomed flask (equipped with an overhead stirrer, cold water condenser, mercury thermometer and addition funnel) is charged with about 1 liter of acetone. To the acetone is added about 1 ml of SnCl_4 with stirring. Into an addition funnel positioned over the reaction flask is added about 200 g of the just prepared n-pentyl glycidyl ether. The glycidyl ether is added very slowly to the

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stirring acetone solution (the rate is adjusted to control the exotherm). The reaction is allowed to proceed for about 1 hr after complete addition of the glycidyl ether (maximum temperature about 52°C).

Hydrolysis

The apparatus is converted for distillation and a heating mantle and temperature controller are added. The crude reaction mix is concentrated via distillation of about 600 ml of acetone. To the cooled concentrated solution are added about 1 liter of aqueous sulfuric acid (about 20% concentration) and about 500 ml of hexanes. The content of the flask is then heated to about 50°C with stirring (the apparatus is adjusted to collect and separate the liberated acetone). The hydrolysis reaction is continued until TLC (Thin Layer Chromatography) analysis confirms the completion of reaction.

The crude reaction mix is cooled and the aqueous layer is separated and discarded. The organic layer is then diluted with about 1 liter of warm water and the pH is adjusted to about 7 by the addition of dilute aqueous NaOH (1N). The aqueous layer is again separated and the organic phase is washed 3 times with fresh water. The organic phase is then separated and evaporated via a rotary evaporator. The residue is then diluted with fresh hexanes and the desired product is extracted into methanol/water solution (about 70/30 weight ratio). The methanol/water solution is again evaporated to dryness via a rotary evaporator (with additional methanol added to facilitate the water evaporation). The residue is then filtered hot through glass microfiber filter paper to obtain the n-pentyl monoglycerol ether.

PREPARATION OF DI(HYDROXYALKYL) ETHERS

Synthesis of bis(2-hydroxybutyl) ether

A 500 ml, three neck, round bottom flask equipped with magnetic stirrer, internal thermometer, addition funnel, condenser, argon supply, and heating mantle, is flushed with argon. Then 1,2-butanediol (about 270g, about 3 moles, Aldrich) is added and sodium metal (about 1.2 g, about 0.05 moles, Aldrich) is added and the sodium is allowed to dissolve. Then the reaction mixture is heated to about 100°C and epoxybutane (about 71g, about 1 mole, Aldrich) is added dropwise with stirring. Heating is continued until the reflux of epoxybutane has ceased and heating is continued for an additional hour to drive the conversion to completion. The reaction mixture is neutralized with sulfuric acid, the salts are removed by filtration, and the liquid is fractionally distilled under vacuum to recover the excess butanediol. The desired ether is obtained as a residue. Optionally, it is purified by further vacuum distillation.

Synthesis of bis(2-hydroxycyclopentyl) ether

A 1-liter, three neck, round bottom flask equipped with magnetic stirrer, internal thermometer, addition funnel, condenser, argon supply, and heating mantle, is flushed with argon. Then 1,2-cyclopentanediol (about 306 g, about 3 moles, Aldrich) is added and boron trifluoride diethyl etherate (about 0.14 g, about 0.01 moles, cis-trans isomer mixture, Aldrich) is added. Then the reaction mixture is held at about 10-40°C as cyclopentene oxide (about 84 g, about 1 mole, Aldrich) is added dropwise with stirring until all the cyclopentene oxide has reacted. The reaction mixture is neutralized with sodium hydroxide, and the liquid is fractionally distilled under vacuum to recover the excess cyclopentanediol. The desired ether is obtained as a residue. Optionally, it is purified by further vacuum distillation.

The above disclosed methods are illustrative only, for purposes of assisting those skilled in the art in the practice of the invention, and are not limiting.

All percentages, ratios and proportions herein are by weight, unless otherwise specified, and all numbers are approximations. All documents cited are, in relevant part, incorporated herein by reference.

The following non-limiting Examples show clear, or translucent, products with acceptable viscosities.

The compositions in the Examples below are made by first preparing an oil seat of DEQA softener active at ambient temperature. The softener active can be heated to melting at, e.g., about 130-150°F (about 55-66°C), if the softener active is not fluid at room temperature. The softener active is mixed using an IKA RW 25® mixer for about 2 to about 5 minutes at about 150 rpm. Separately, an acid/water seat is prepared by mixing the HCl with deionized (DI) water at ambient temperature. If the softener active and/or the principal solvent(s) are not fluid at room temperature and need to be heated, the acid/water seat should also be heated to a suitable temperature, e.g., about 100°F (about 38°C) and maintaining said temperature with a water bath. The principal solvent(s) (melted at suitable temperatures if their melting points are above room temperature) are added to the softener premix and said premix is mixed for about 5 minutes. The acid/water seat is then added to the softener premix and mixed for about 20 to about 30 minutes or until the composition is clear and homogeneous. The composition is allowed to air cool to ambient temperature.

The following are suitable N,N-di(fatty acyl-oxyethyl)-N,N-dimethyl ammonium chloride fabric softening actives (DEQA's), with approximate distributions of fatty acyl groups given, that are used hereinafter for preparing the following compositions.

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Fatty Acyl Group	DEQA ¹	DEQA ²	DEQA ³	DEQA ⁴	DEQA ⁵
C12	trace	trace	0	0	0
C14	3	3	0	0	0
C16	4	4	5	5	5
C18	0	0	5	6	6
C14:1	3	3	0	0	
C16:1	11	7	0	0	3
C18:1	74	73	71	68	67
C18:2	4	8	8	11	11
C18:3	0	1	1	2	2
C20:1	0	0	2	2	2
C20 and up	0	0	2	0	0
Unknowns	0	0	6	6	7
<i>Total</i>	99	99	100	100	102
IV	86-90	88-95	99	100	95
cis/trans	20-30	20-30	4	5	5
TPU	4	9	10	13	13

TPU = Total polyunsaturated fatty acyl groups, by weight.

EXAMPLE I

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	43.2	—	26.6	—	26.6	26.6	26.6
DEQA ⁶	—	—	27.5	—	27.5	—	—	—
Ethanol	6	10	5.1	6	3.1	6	4	6
2-Ethyl-1,3-hexanediol	8	—	—	8	9	8	9	—
1,2-Hexanediol	8	20	16	8	9	8	9	16
HCl (pH 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Perfume	—	—	—	—	—	1.0	—	—
Kathon	—	—	3 ppm	3 ppm	—	—	—	—
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

DEQA⁶ N,N-di(coco-oyl-oxyethyl)-N,N-dimethyl ammonium chloride.

ClogP values of 2-ethyl-1,3-hexanediol and 1,2-hexanediol are 0.60 and 0.53, respectively, and are within the preferred ClogP range.

The above Examples show clear, or translucent, products with acceptable viscosities.

EXAMPLE 1A

[illegible]

All 1,2-alkanediols in Example IA, except 1,2-hexanediol, have ClogP values outside the effective 0.15 to 0.64 range. Only the composition of Example I-8, containing 1,2-hexanediol, is a clear composition with acceptable viscosities both at room temperature and at about 40°F (about 4°C); compositions of Comparative Examples I-8A to I-8F are not clear and/or do not have acceptable viscosities.

EXAMPLE 1B

[illegible]

All hexanediol isomers in Example IB, except 1,2-hexanediol, have ClogP values outside the effective 0.15 to 0.64 range. Only the composition of Example I-8, containing 1,2-hexanediol, is a clear composition with acceptable viscosities both at room temperature and at about 40°F (about 4°C); compositions of Comparative Examples I-8G to I-8L are not clear and/or do not have acceptable viscosities.

EXAMPLE I-C

<u>Component</u>	8	8M	8N	8O	8P	Compa- rative 8Q
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	26.6	26.6	26.6	26.6
1,2-Hexanediol	16	9.2	13	9	9	—
1,2-Pentanediol	—	6.8	2	—	—	6.8
1,2-Octanediol	—	—	1	—	—	9.2
Ethyl lactate	—	—	—	9	—	—
Isopropyl lactate	—	—	—	—	9	—
Ethanol	6	6	6	6	6	6
HCl (pH 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

The compositions of Example I-8, I-8M, and I-8N which contain effective levels of the preferred 1,2-hexanediol principal solvent are clear compositions with acceptable viscosities both at room temperature and at about 40°F (about 4°C). The compositions of Example I-8O and I-8P which contain effective levels of the preferred 1,2-hexanediol principal solvent are clear compositions with acceptable viscosities at room temperature, and are clear at about 40°F (about 4°C) with a small layer which is separated on top, but recover and become clear when brought back to room temperature. The compositions of Comparative Examples I-8Q which does not contain an effective amount of the preferred 1,2-hexanediol is not clear and/or does not have acceptable viscosities.

EXAMPLE II

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	—	26.6	—	20.0	20.0	26.6	—
DEQA ⁶	27.5	—	27.5	6.8	6.8	—	27.5

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Ethanol	5.1	6	5.1	3.8	—	4	5.1
Isopropanol	—	—	—	—	—	2	—
2-Ethyl-1,3-hexanediol	—	—	—	16	18	—	—
1,2-Hexanediol	16	—	—	—	—	16	—
2,5-Dimethyl-2,5-hexanediol	—	—	—	—	—	—	16
2-Methyl-2-propyl-1,3-propanediol	—	16	16	—	—	—	—
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE III

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	—	26.6	—	26.6	26.6	26.6	—
DEQA ²	26	—	26	—	—	—	26
Ethanol	5.1	6	5.1	3.8	—	4	5.1
Isopropanol	—	—	—	—	—	2	—
n-Propanol	18	—	—	—	—	—	—
2-Butanol	—	16	—	—	—	—	—
2-methyl-1-propanol	—	—	18	—	—	2	—
2-methyl-2-propanol	—	—	—	20	—	—	—
2,3-butanediol, 2,3-dimethyl-	—	—	—	—	18	—	—
1,2-butanediol, 2,3-dimethyl-	—	—	—	—	—	16	—
1,2-butanediol, 3,3-dimethyl-	—	—	—	—	—	—	18
CaCl ₂	—	0.25	—	—	—	—	—
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE IV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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2,3-pentanediol, 2-methyl-	18	—	—	—	—	—	—
2,3-pentanediol, 3-methyl	—	18	—	—	—	—	—
2,3-pentanediol, 4-methyl-	—	—	18	—	—	—	—
2,3-hexanediol	—	—	—	17	—	—	—
3,4-hexanediol	—	—	—	—	18	—	—
1,2-butanediol, 2-ethyl-	—	—	—	—	—	17	—
1,2-pentanediol, 2-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE V

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-pentanediol, 3-methyl-	18	—	—	—	—	—	—
1,2-pentanediol, 4-methyl-	—	18	—	—	—	—	—
1,2-hexanediol	—	—	18	—	—	—	—
1,3-propanediol, 2-butyl-	—	—	—	17	—	—	—
1,3-propanediol, 2,2-diethyl-	—	—	—	—	18	—	—
1,3-propanediol, 2-(1-methylpropyl)-	—	—	—	—	—	17	—
1,3-propanediol, 2-(2-methylpropyl)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE VI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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1,2-butanediol, 2,3,3-trimethyl-	18	—	—	—	—	—	—
1,4-butanediol, 2-ethyl-2-methyl-	—	18	—	—	—	—	—
1,4-butanediol, 2-ethyl-3-methyl-	—	—	18	—	—	—	—
1,4-butanediol, 2-propyl-	—	—	—	17	—	—	—
1,4-butanediol, 2-isopropyl-	—	—	—	—	18	—	—
1,5-pentanediol, 2,2-dimethyl-	—	—	—	—	—	17	—
1,5-pentanediol, 2,3-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE VII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	—	26.6	—	20.0	20.0	26.6
DEQA ²	27.5	—	27.5	6.8	6.8	—
Ethanol	5.1	6	5.1	3.8	—	4
Isopropanol	—	—	—	—	—	2
1,5-pentanediol, 2,4-dimethyl-	18	—	—	—	—	—
1,5-pentanediol, 3,3-dimethyl-	—	18	—	—	—	—
2,3-pentanediol, 2,3-dimethyl-	—	—	18	—	—	—
2,3-pentanediol, 2,4-dimethyl-	—	—	—	16	—	—
2,3-pentanediol, 3,4-dimethyl-	—	—	—	—	18	—
2,3-pentanediol, 4,4-dimethyl-	—	—	—	—	—	16
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE VIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

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Isopropanol	2	—	—	—	6	2	—
3,4-pentanediol, 2,3-dimethyl-	18	—	—	—	—	—	—
1,5-pentanediol, 2-ethyl-	—	18	—	—	—	—	—
1,6-hexanediol, 2-methyl-	—	—	18	—	—	—	—
1,6-hexanediol, 3-methyl-	—	—	—	17	—	—	—
2,3-hexanediol, 2-methyl-	—	—	—	—	18	—	—
2,3-hexanediol, 3-methyl-	—	—	—	—	—	17	—
2,3-hexanediol, 4-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE IX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,3-hexanediol, 5-methyl-	18	—	—	—	—	—	—
3,4-hexanediol, 2-methyl-	—	18	—	—	—	—	—
3,4-hexanediol, 3-methyl-	—	—	18	—	—	—	—
1,3-heptanediol	—	—	—	17	—	—	—
1,4-heptanediol	—	—	—	—	18	—	—
1,5-heptanediol	—	—	—	—	—	17	—
1,6-heptanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE X

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

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[illegible]

EXAMPLE XI

[illegible]

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EXAMPLE XII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 2,2-diethyl-	18	—	—	—	—	—	—
1,3-butanediol, 2,2-diethyl-	—	18	—	—	—	—	—
1,3-butanediol, 2-(1-methylpropyl)-	—	—	18	—	—	—	—
1,3-butanediol, 2-butyl-	—	—	—	17	—	—	—
1,3-butanediol, 2-ethyl-	—	—	—	—	18	—	—
2,3-dimethyl-	—	—	—	—	—	17	—
1,3-butanediol, 2-(1,1-dimethylethyl)-	—	—	—	—	—	—	18
1,3-butanediol, 2-(2-methylpropyl)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 2-methyl-2-isopropyl-	18	—	—	—	—	—	—
1,3-butanediol, 2-methyl-2-propyl-	—	18	—	—	—	—	—
1,3-butanediol, 3-methyl-2-isopropyl-	—	—	18	—	—	—	—
1,3-butanediol, 3-methyl-2-propyl-	—	—	—	17	—	—	—
1,4-butanediol, 2,2-diethyl-	—	—	—	—	18	—	—
1,4-butanediol, 2-methyl-2-propyl-	—	—	—	—	—	17	—
1,4-butanediol, 2-(1-methylpropyl)-	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-butanediol, 2-ethyl- 2,3-dimethyl-	18	—	—	—	—	—	—
1,4-butanediol, 2-ethyl- 3,3-dimethyl-	—	18	—	—	—	—	—
1,4-butanediol, 2-(1,1- dimethylethyl)-	—	—	18	—	—	—	—
1,4-butanediol, 2-(2- methylpropyl)-	—	—	—	17	—	—	—
1,4-butanediol, 2-methyl- 3-propyl-	—	—	—	—	18	—	—
1,4-butanediol, 3-methyl- 2-isopropyl-	—	—	—	—	—	17	—
1,4-butanediol, 3-methyl- 2-isopropyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-pentanediol, 2,2,3- trimethyl-	18	—	—	—	—	—	—
1,3-pentanediol, 2,2,4- trimethyl-	—	18	—	—	—	—	—
1,3-pentanediol, 2,3,4- trimethyl-	—	—	18	—	—	—	—
1,3-pentanediol, 2,4,4- trimethyl-	—	—	—	17	—	—	—

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1,3-pentanediol, 3,4,4-trimethyl-	—	—	—	—	18	—	—
1,4-pentanediol, 2,2,3-trimethyl-	—	—	—	—	—	17	—
1,4-pentanediol, 2,2,4-trimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-pentanediol, 2,3,3-trimethyl-	18	—	—	—	—	—	—
1,4-pentanediol, 2,3,4-trimethyl-	—	18	—	—	—	—	—
1,4-pentanediol, 3,3,4-trimethyl-	—	—	18	—	—	—	—
1,5-pentanediol, 2,2,3-trimethyl-	—	—	—	17	—	—	—
1,5-pentanediol, 2,2,4-trimethyl-	—	—	—	—	18	—	—
1,5-pentanediol, 2,3,3-trimethyl-	—	—	—	—	—	17	—
1,5-pentanediol, 2,3,4-trimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-pentanediol, 2,3,4-trimethyl-	18	—	—	—	—	—	—

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2,4-pentanediol, 2,3,3-trimethyl-	—	18	—	—	—	—	—
2,4-pentanediol, 2,3,4-trimethyl-	—	—	18	—	—	—	—
2,4-pentanediol, 2,3,3-trimethyl-	—	—	—	17	—	—	—
2,4-pentanediol, 2,3,3-trimethyl-	—	—	—	—	18	—	—
2,4-pentanediol, 2,3,4-trimethyl-	—	—	—	—	—	17	—
1,3-pentanediol, 2-ethyl-2-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-pentanediol, 2-ethyl-3-methyl-	18	—	—	—	—	—	—
1,3-pentanediol, 2-ethyl-4-methyl-	—	18	—	—	—	—	—
1,3-pentanediol, 3-ethyl-2-methyl-	—	—	18	—	—	—	—
1,4-pentanediol, 2-ethyl-2-methyl-	—	—	—	17	—	—	—
1,4-pentanediol, 2-ethyl-3-methyl-	—	—	—	—	18	—	—
1,4-pentanediol, 2-ethyl-4-methyl-	—	—	—	—	—	17	—
1,4-pentanediol, 3-ethyl-2-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26

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PCT/US96/11856

PCT/US96/11856

EXAMPLE XXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-pentanediol, 2-isopropyl-	18	—	—	—	—	—	—
2,4-pentanediol, 3-propyl-	—	18	—	—	—	—	—
1,3-hexanediol, 2,2-dimethyl-	—	—	18	—	—	—	—
1,3-hexanediol, 2,3-dimethyl-	—	—	—	17	—	—	—
1,3-hexanediol, 2,4-dimethyl-	—	—	—	—	18	—	—
1,3-hexanediol, 2,5-dimethyl-	—	—	—	—	—	17	—
1,3-hexanediol, 3,4-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-hexanediol, 3,5-dimethyl-	18	—	—	—	—	—	—
1,3-hexanediol, 4,5-dimethyl-	—	18	—	—	—	—	—
1,4-hexanediol, 2,2-dimethyl-	—	—	18	—	—	—	—
1,4-hexanediol, 2,3-dimethyl-	—	—	—	17	—	—	—
1,4-hexanediol, 2,4-dimethyl-	—	—	—	—	18	—	—
1,4-hexanediol, 2,5-dimethyl-	—	—	—	—	—	17	—
1,4-hexanediol, 3,3-dimethyl-	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	—	26.6	—	20.0	20.0	26.6	—
DEQA ⁶	27.5	—	27.5	6.8	6.8	—	27.5
Ethanol	5.1	6	5.1	3.8	—	4	5.1
Isopropanol	—	—	—	—	—	2	—
1,4-hexanediol, 3,4-dimethyl-	18	—	—	—	—	—	—
1,4-hexanediol, 3,5-dimethyl-	—	18	—	—	—	—	—
1,3-hexanediol, 4,4-dimethyl-	—	—	18	—	—	—	—
1,4-hexanediol, 4,5-dimethyl-	—	—	—	17	—	—	—
1,4-hexanediol, 5,5-dimethyl-	—	—	—	—	18	—	—
1,5-hexanediol, 2,2-dimethyl-	—	—	—	—	—	16	—
1,5-hexanediol, 2,3-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-hexanediol, 2,4-dimethyl-	18	—	—	—	—	—	—
1,5-hexanediol, 2,5-dimethyl-	—	18	—	—	—	—	—
1,5-hexanediol, 3,3-dimethyl-	—	—	18	—	—	—	—
1,5-hexanediol, 1,3,4-dimethyl-	—	—	—	17	—	—	—

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1,5-hexanediol, 3,5-dimethyl-	—	—	—	—	18	—	—
1,5-hexanediol, 4,5-dimethyl-	—	—	—	—	—	17	—
1,6-hexanediol, 2,2-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,6-hexanediol, 2,3-dimethyl-	18	—	—	—	—	—	—
1,6-hexanediol, 2,4-dimethyl-	—	18	—	—	—	—	—
1,6-hexanediol, 2,5-dimethyl-	—	—	18	—	—	—	—
1,6-hexanediol, 3,3-dimethyl-	—	—	—	17	—	—	—
1,6-hexanediol, 3,4-dimethyl-	—	—	—	—	18	—	—
2,4-hexanediol, 2,3-dimethyl-	—	—	—	—	—	17	—
2,4-hexanediol, 2,4-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-hexanediol, 2,5-dimethyl-	18	—	—	—	—	—	—

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2,4-hexanediol, 3,3-dimethyl-	—	18	—	—	—	—	—
2,4-hexanediol, 3,4-dimethyl-	—	—	18	—	—	—	—
2,4-hexanediol, 3,5-dimethyl-	—	—	—	17	—	—	—
2,4-hexanediol, 4,5-dimethyl-	—	—	—	—	18	—	—
2,4-hexanediol, 5,5-dimethyl-	—	—	—	—	—	17	—
2,5-hexanediol, 2,3-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,5-hexanediol, 2,4-dimethyl-	18	—	—	—	—	—	—
2,5-hexanediol, 2,5-dimethyl-	—	18	—	—	—	—	—
2,5-hexanediol, 3,3-dimethyl-	—	—	18	—	—	—	—
2,5-hexanediol, 3,4-dimethyl-	—	—	—	17	—	—	—
2,6-hexanediol, 3,3-dimethyl-	—	—	—	—	18	—	—
1,3-hexanediol, 2-ethyl-	—	—	—	—	—	17	—
1,3-hexanediol, 4-ethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

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Isopropanol	2	—	—	—	6	2	—
1,3-hexanediol, 2-ethyl-	18	—	—	—	—	—	—
1,3-hexanediol, 4-ethyl-	—	18	—	—	—	—	—
1,4-hexanediol, 2-ethyl-	—	—	18	—	—	—	—
1,4-hexanediol, 4-ethyl-	—	—	—	17	—	—	—
1,5-hexanediol, 2-ethyl-	—	—	—	—	18	—	—
1,4-hexanediol, 4-ethyl-	—	—	—	—	—	17	—
1,5-hexanediol, 2-ethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-hexanediol, 3-ethyl-	18	—	—	—	—	—	—
2,4-hexanediol, 4-ethyl-	—	18	—	—	—	—	—
2,5-hexanediol, 3-ethyl-	—	—	18	—	—	—	—
2,5-hexanediol, 3-ethyl-	—	—	—	17	—	—	—
1,3-heptanediol, 2-methyl-	—	—	—	—	18	—	—
1,3-heptanediol, 3-methyl-	—	—	—	—	—	17	—
1,3-heptanediol, 4-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-heptanediol, 5-methyl-	18	—	—	—	—	—	—
1,3-heptanediol, 6-methyl-	—	18	—	—	—	—	—

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1,4-heptanediol, 2-methyl-	—	—	18	—	—	—	—
1,4-heptanediol, 3-methyl-	—	—	—	17	—	—	—
1,4-heptanediol, 4-methyl-	—	—	—	—	18	—	—
1,4-heptanediol, 5-methyl-	—	—	—	—	—	17	—
1,4-heptanediol, 6-methyl-	—	—	—	—	—	—	18
Perfume	1	1.2	1	1.35	1	1	1.3
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-heptanediol, 2-methyl-	18	—	—	—	—	—	—
1,5-heptanediol, 3-methyl-	—	18	—	—	—	—	—
1,5-heptanediol, 4-methyl-	—	—	18	—	—	—	—
1,5-heptanediol, 5-methyl-	—	—	—	17	—	—	—
1,5-heptanediol, 6-methyl-	—	—	—	—	18	—	—
1,6-heptanediol, 2-methyl-	—	—	—	—	—	17	—
1,6-heptanediol, 3-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXI A

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26

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[illegible]

EXAMPLE XXXI B

[illegible]

EXAMPLE XXXI D

[illegible]

EXAMPLE XXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-hexanediol, 3,3,4-trimethyl-	18	—	—	—	—	—	—
2,4-hexanediol, 3,3,5-trimethyl-	—	18	—	—	—	—	—
2,4-hexanediol, 3,5,5-trimethyl-	—	—	18	—	—	—	—
2,4-hexanediol, 4,5,5-trimethyl-	—	—	—	17	—	—	—
2,5-hexanediol, 3,3,4-trimethyl-	—	—	—	—	18	—	—
2,5-hexanediol, 3,3,5-trimethyl-	—	—	—	—	—	17	—
1,2-propanediol, 3-(n-pentyloxy)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXIIA

<u>Component</u>	<u>7</u>	<u>Compa</u> <u>rative</u>	<u>Compa</u> <u>rative</u>	<u>Compa</u> <u>rative</u>	<u>Comp</u> <u>arative</u>	<u>Compa</u> <u>rative</u>	<u>Compa</u> <u>rative</u>
	<u>Wt. %</u>	<u>7A</u>	<u>7B</u>	<u>7C</u>	<u>7D</u>	<u>7E</u>	<u>7F</u>
DEQA ¹	26.6	26.6	26.6	26.6	26.6	26.6	26.6
1,2-propanediol, 3-(n-pentyloxy)-	16	—	—	—	—	—	—
1,2-propanediol, 3-ethyloxy-	—	16	—	—	—	—	—
1,2-propanediol, 3-butyloxy-	—	—	16	—	—	—	—
1,2-propanediol, 3-octyloxy-	—	—	—	16	—	—	—
1,2-propanediol, 3-(2-ethylhexyloxy)-	—	—	—	—	16	—	—
Glyceryl monooleate	—	—	—	—	—	16	—
Glyceryl monostearate	—	—	—	—	—	—	16
Ethanol	6	6	6	6	6	6	6

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CaCl ₂	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HCl (pH 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

3-(n-Pentyloxy)-1,2-propanediol has a ClogP of 0.54, which is within the preferred range of 0.40 to 0.60, and all other 1,2-propanediol derivatives in Example XXXIIA have ClogP values outside the effective 0.15 to 0.64 range. Only the composition of Example XXXII-7, which contains 3-(n-pentyloxy)-1,2-propanediol is a clear composition with acceptable viscosities both at room temperature and at about 40°F (about 4°C); compositions of Comparative Examples XXXII-7A to XXXII-7F are not clear and/or do not have acceptable viscosities.

EXAMPLE XXXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-propanediol, 3-(2-pentyloxy)-	18	—	—	—	—	—	—
1,2-propanediol, 3-(3-pentyloxy)-	—	18	—	—	—	—	—
1,2-propanediol, 3-(2-methyl-1-butyloxy)-	—	—	18	—	—	—	—
1,2-propanediol, 3-(iso-amyloxy)-	—	—	—	17	—	—	—
1,2-propanediol, 3-(3-methyl-2-butyloxy)-	—	—	—	—	18	—	—
1,3-pentanediol, 2-propyl	—	—	—	—	—	17	—
2,6-octanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	26
DEQA ⁶	—	—	26	26	—	—	—
Ethanol	4	6	6	6	—	4	4
Isopropanol	2	—	—	—	6	2	2

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1-isopropyl-1,2-cyclobutanediol	18	—	—	—	—	—	—
3-ethyl-4-methyl-1,2-cyclobutanediol	—	18	—	—	—	—	—
3-propyl-1,2-cyclobutanediol	—	—	18	—	—	—	—
3-isopropyl-1,2-cyclobutanediol	—	—	—	17	—	—	—
1-ethyl-1,2-cyclopentanediol	—	—	—	—	18	—	—
1,2-dimethyl-1,2-cyclopentanediol	—	—	—	—	—	17	—
2,4-pentanediol, 2,3,4-trimethyl- n-BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	

EXAMPLE XXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-dimethyl-1,2-cyclopentanediol	18	—	—	—	—	—	—
2,4,5-trimethyl-1,3-cyclopentanediol	—	18	—	—	—	—	—
3,3-dimethyl-1,2-cyclopentanediol	—	—	18	—	—	—	—
3,4-dimethyl-1,2-cyclopentanediol	—	—	—	17	—	—	—
3,5-dimethyl-1,2-cyclopentanediol	—	—	—	—	18	—	—
3-ethyl-1,2-cyclopentanediol	—	—	—	—	—	17	—
1-phenyl-1,2-ethanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXVA

<u>Component</u>	<u>5</u>	<u>Comparative</u>	<u>Comparative</u>	<u>Comparative</u>
	<u>Wt. %</u>	<u>5A</u>	<u>5B</u>	<u>5C</u>
DEQA ¹	26.6	26.6	26.6	26.6

cis-1,2-bis(hydroxymethyl)cyclohexane	16	—	—	—
1,4-bis(hydroxymethyl)cyclohexane	—	16	—	—
1,2-Cyclohexanediol	—	—	16	—
4,5-Dimethyl-1,2-cyclohexanediol	—	—	—	16
Ethanol	6	6	6	6
HCl (pH 2-3.5)	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.

Cis-1,2-bis(hydroxymethyl)cyclohexane has a ClogP of 0.47, which is within the preferred range of 0.40 to 0.60. 1,4-Bis(hydroxymethyl)cyclohexane also has a ClogP of 0.47, which is within the preferred range of 0.40 to 0.60, but has a center of symmetry, and does not form an acceptable composition (Composition XXXVA-5A). 1,2-cyclohexanediol and 4,5-dimethyl-1,2-cyclohexanediol have ClogP values which are outside the effective range of 0.15-0.64. Only the composition of Example XXXVA-5 is a clear composition with acceptable viscosities both at room temperature and at about 40°F (about 4°C); compositions of Comparative Examples XXXVA-5A to XXXVA-5C are not clear and/or do not have acceptable viscosities.

EXAMPLE XXXVI

[illegible]

EXAMPLE XXXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2,2-diethyl- E ₅	18	—	—	—	—	—	—
1,3-propanediol, 2,2-diethyl- PO ₁	—	18	—	—	—	—	—
1,3-propanediol, 2,2-dimethyl- 2(Me E ₂)	—	—	18	—	—	—	—
1,3-propanediol, 2,2-dimethyl- PO ₄	—	—	—	17	—	—	—
1,3-propanediol, 2-(1-methylpropyl)- E ₅	—	—	—	—	18	—	—
1,3-propanediol, 2-(1-methylpropyl)- PO ₁	—	—	—	—	—	17	—
1,3-propanediol, 2-(2-methylpropyl)- E ₅	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-(2-methylpropyl)- PO ₁	18	—	—	—	—	—	—
1,3-propanediol, 2-ethyl- (Me E ₉)	—	18	—	—	—	—	—
1,3-propanediol, 2-ethyl- 2(Me E ₁)	—	—	18	—	—	—	—
1,3-propanediol, 2-ethyl- PO ₃	—	—	—	17	—	—	—
1,3-propanediol, 2-ethyl- 2-methyl- (Me E ₄)	—	—	—	—	18	—	—
1,3-propanediol, 2-ethyl- 2-methyl- PO ₂	—	—	—	—	—	17	—
1,3-propanediol, 2-ethyl- 2-methyl- BO ₁	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-isopropyl- (Me E ₄)	18	—	—	—	—	—	—
1,3-propanediol, 2-isopropyl- PO ₂	—	18	—	—	—	—	—
1,3-propanediol, 2-isopropyl- BO ₁	—	—	18	—	—	—	—
1,3-propanediol, 2-methyl- 2(Me E ₄)	—	—	—	17	—	—	—
1,3-propanediol, 2-methyl- PO ₅	—	—	—	—	18	—	—
1,3-propanediol, 2-methyl- BO ₂	—	—	—	—	—	17	—
1,3-propanediol, 2-methyl-2-isopropyl- E ₆	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-methyl-2-isopropyl- PO ₁	18	—	—	—	—	—	—
1,3-propanediol, 2-methyl-2-propyl- E ₄	—	18	—	—	—	—	—
1,3-propanediol, 2-methyl-2-propyl- PO ₁	—	—	18	—	—	—	—
1,3-propanediol, 2-propyl- (Me E ₃)	—	—	—	17	—	—	—

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1,3-propanediol, 2-propyl- PO ₂	—	—	—	—	18	—	—
1,2-butanediol, 2-ethyl-E ₂	—	—	—	—	—	17	—
1,2-butanediol, 2-ethyl-n-BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-butanediol, 2-methyl-(Me E ₂)	18	—	—	—	—	—	—
1,2-butanediol, 2-methyl-PO ₁	—	18	—	—	—	—	—
1,2-butanediol, 3,3-dimethyl- E ₄	—	—	18	—	—	—	—
1,2-butanediol, 3,3-dimethyl- n-BO ₁	—	—	—	17	—	—	—
1,2-butanediol, 3-methyl-(Me E ₂)	—	—	—	—	18	—	—
1,2-butanediol, 3-methyl-PO ₁	—	—	—	—	—	17	—
1,3-butanediol 2(Me E ₅)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol PO ₅	18	—	—	—	—	—	—
1,3-butanediol BO ₂	—	18	—	—	—	—	—
1,3-butanediol, 2,2,3-trimethyl- (Me E ₂)	—	—	18	—	—	—	—

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1,3-butanediol, 2,2,3-trimethyl- PO ₂	—	—	—	17	—	—	—
1,3-butanediol, 2,2-dimethyl- (Me E ₆)	—	—	—	—	18	—	—
1,3-butanediol, 2,2-dimethyl- PO ₃	—	—	—	—	—	17	—
1,3-butanediol, 2,3-dimethyl- (Me E ₆)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 2,3-dimethyl- PO ₃	18	—	—	—	—	—	—
1,3-butanediol, 2-ethyl- (Me E ₄)	—	18	—	—	—	—	—
1,3-butanediol, 2-ethyl- PO ₂	—	—	18	—	—	—	—
1,3-butanediol, 2-ethyl- BO ₁	—	—	—	17	—	—	—
1,3-butanediol, 2-ethyl- 2-methyl- (Me E ₁)	—	—	—	—	18	—	—
1,3-butanediol, 2-ethyl- 2-methyl- PO ₁	—	—	—	—	—	17	—
1,3-butanediol, 2-ethyl- 3-methyl- (Me E ₁)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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1,3-butanediol, 2-ethyl-3-methyl- PO ₁	18	—	—	—	—	—	—
1,3-butanediol, 2-isopropyl- (Mc E ₁)	—	18	—	—	—	—	—
1,3-butanediol, 2-isopropyl- PO ₁	—	—	18	—	—	—	—
1,3-butanediol, 2-methyl-2(Mc E ₂)	—	—	—	17	—	—	—
1,3-butanediol, 2-methyl-PO ₄	—	—	—	—	18	—	—
1,3-butanediol, 2-propyl-E ₆	—	—	—	—	—	17	—
1,3-butanediol, 2-propyl-PO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 3-methyl-2(Mc E ₂)	18	—	—	—	—	—	—
1,3-butanediol, 3-methyl-PO ₄	—	18	—	—	—	—	—
1,4-butanediol 2(Mc E ₃)	—	—	18	—	—	—	—
1,4-butanediol PO ₄	—	—	—	17	—	—	—
1,4-butanediol BO ₂	—	—	—	—	18	—	—
1,4-butanediol, 2,2,3-trimethyl- E ₆	—	—	—	—	—	17	—
1,4-butanediol, 2,2,3-trimethyl- PO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE XXXXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

[illegible]

EXAMPLE XXXXVII

[illegible]

EXAMPLE XXXXVIII

[illegible]

EXAMPLE II

[illegible]

EXAMPLE L

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,3-butanediol, 2-methyl- PO ₂	18	—	—	—	—	—	—
2,3-butanediol, 2-methyl- BO ₁	—	17	—	—	—	—	—
1,2-pentanediol E ₇	—	—	18	—	—	—	—
1,2-pentanediol PO ₁	—	—	—	17	—	—	—
1,2-pentanediol n-BO ₃	—	—	—	—	18	—	—
1,2-pentanediol 2-methyl E ₂	—	—	—	—	—	17	—
1,2-pentanediol 2-methyl n-BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-pentanediol 3-methyl E ₂	18	—	—	—	—	—	—
1,2-pentanediol 3-methyl n-BO ₁	—	18	—	—	—	—	—
1,2-pentanediol 4-methyl E ₂	—	—	18	—	—	—	—
1,2-pentanediol 4-methyl n-BO ₁	—	—	—	17	—	—	—
1,3-pentanediol 2(Me- E ₂)	—	—	—	—	18	—	—
1,3-pentanediol PO ₄	—	—	—	—	—	17	—
1,3-pentanediol, 2,2- dimethyl- (Me-E ₁)	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-pentanediol 2,3-dimethyl- (Me-E ₁)	18	—	—	—	—	—	—
1,3-pentanediol 2,3-dimethyl- PO ₁	—	18	—	—	—	—	—
1,3-pentanediol 2,4-dimethyl- (Me-E ₁)	—	—	18	—	—	—	—
1,3-pentanediol 2,4-dimethyl- PO ₁	—	—	—	17	—	—	—
1,3-pentanediol, 2-ethyl-E ₆	—	—	—	—	18	—	—
1,3-pentanediol, 2-ethyl-PO ₁	—	—	—	—	—	17	—
1,3-pentanediol, 2-methyl- 2(Me-E ₄)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-pentanediol, 2-methyl- PO ₂	18	—	—	—	—	—	—
1,3-pentanediol, 2-methyl- BO ₁	—	18	—	—	—	—	—
1,3-pentanediol 3,4-dimethyl- (Me-E ₁)	—	—	18	—	—	—	—
1,3-pentanediol 3,4-dimethyl- PO ₁	—	—	—	17	—	—	—

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1,3-pentanediol, 3-methyl- 2(Me-E ₄)	—	—	—	—	18	—	—
1,3-pentanediol, 3-methyl- PO ₃	—	—	—	—	—	17	—
1,3-pentanediol, 3-methyl- BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-pentanediol 4,4-dimethyl- (Me-E ₁)	18	—	—	—	—	—	—
1,3-pentanediol 4,4-dimethyl- PO ₁	—	18	—	—	—	—	—
1,3-pentanediol, 4-methyl- PO ₃	—	—	18	—	—	—	—
1,3-pentanediol, 4-methyl- BO ₁	—	—	—	17	—	—	—
1,4-pentanediol 2(Me-E ₂)	—	—	—	—	18	—	—
1,4-pentanediol PO ₃	—	—	—	—	—	17	—
1,4-pentanediol, 2,2-dimethyl- (Me-E ₁)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-pentanediol, 2,2-dimethyl- PO ₁	18	—	—	—	—	—	—

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1,4-pentanediol 2,3-dimethyl- (Me-E ₁)	—	18	—	—	—	—	—
1,4-pentanediol 2,3-dimethyl- PO ₁	—	—	18	—	—	—	—
1,4-pentanediol 2,4-dimethyl- (Me-E ₁)	—	—	—	17	—	—	—
1,4-pentanediol 2,4-dimethyl- PO ₁	—	—	—	—	18	—	—
1,4-pentanediol, 2-methyl- 2(Me-E ₄)	—	—	—	—	—	17	—
1,4-pentanediol, 2-methyl- PO ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-pentanediol, 2-methyl- BO ₁	18	—	—	—	—	—	—
1,4-pentanediol 3,3-dimethyl- (Me-E ₁)	—	18	—	—	—	—	—
1,4-pentanediol 3,3-dimethyl- PO ₁	—	—	18	—	—	—	—
1,4-pentanediol 3,4-dimethyl- (Me-E ₁)	—	—	—	17	—	—	—
1,4-pentanediol 3,4-dimethyl- PO ₁	—	—	—	—	18	—	—
1,4-pentanediol, 3-methyl- 2(Me-E ₄)	—	—	—	—	—	17	—
1,4-pentanediol, 3-methyl- PO ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26

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[illegible]

EXAMPLE LVIII

[illegible]

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EXAMPLE LIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-pentanediol, 2-methyl- (Me-E ₂)	18	—	—	—	—	—	—
1,5-pentanediol, 2-methyl- PO ₂	—	18	—	—	—	—	—
1,5-pentanediol, 3,3-dimethyl- E ₄	—	—	18	—	—	—	—
1,5-pentanediol, 3,3-dimethyl- PO ₁	—	—	—	17	—	—	—
1,5-pentanediol, 3-methyl- (Me-E ₂)	—	—	—	—	18	—	—
1,5-pentanediol, 3-methyl- PO ₂	—	—	—	—	—	17	—
2,3-pentanediol (Me-E ₂)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,3-pentanediol PO ₂	18	—	—	—	—	—	—
2,3-pentanediol, 2-methyl- E ₄	—	18	—	—	—	—	—
2,3-pentanediol, 2-methyl- PO ₁	—	—	18	—	—	—	—
2,3-pentanediol, 2-methyl- n-BO ₂	—	—	—	17	—	—	—
1,3-pentanediol, 2,2-dimethyl- PO ₁	—	—	—	—	18	—	—
2,3-pentanediol, 3-methyl- E ₄	—	—	—	—	—	17	—
2,3-pentanediol, 3-methyl- PO ₁	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-butanediol, 3-ethyl- 1-methyl- n-BO ₂	18	—	—	—	—	—	—
2,3-pentanediol, 3- methyl- n-BO ₂	—	18	—	—	—	—	—
2,3-pentanediol, 4- methyl- E ₄	—	—	18	—	—	—	—
2,3-pentanediol, 4- methyl- PO ₁	—	—	—	17	—	—	—
2,3-pentanediol, 4- methyl- n-BO ₂	—	—	—	—	18	—	—
1,3-pentanediol, 2,2- dimethyl- n-BO ₃	—	—	—	—	—	17	—
2,4-pentanediol 2(Me- E ₃)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-pentanediol PO ₄	18	—	—	—	—	—	—
2,4-pentanediol, 2,3- dimethyl- (Me-E ₃)	—	18	—	—	—	—	—
2,4-pentanediol, 2,3- dimethyl- PO ₂	—	—	18	—	—	—	—
2,4-pentanediol, 2,4- dimethyl- (Me-E ₃)	—	—	—	17	—	—	—

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2,4-pentanediol, 2,4-dimethyl- PO ₂	—	—	—	—	18	—	—
2,4-pentanediol, 2-methyl- (Me-E ₈)	—	—	—	—	—	17	—
2,4-pentanediol, 2-methyl- PO ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt.</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	% 26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-pentanediol, 3,3-dimethyl- (Me-E ₂)	18	—	—	—	—	—	—
2,4-pentanediol, 3,3-dimethyl- PO ₂	—	18	—	—	—	—	—
2,4-pentanediol, 3-methyl- (Me-E ₈)	—	—	18	—	—	—	—
2,4-pentanediol, 3-methyl- PO ₃	—	—	—	17	—	—	—
1,3-hexanediol (Me-E ₃)	—	—	—	—	18	—	—
1,3-hexanediol PO ₂	—	—	—	—	—	17	—
1,3-hexanediol BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-hexanediol, 2-methyl- E ₆	18	—	—	—	—	—	—
1,3-hexanediol, 2-methyl- PO ₁	—	18	—	—	—	—	—

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1,3-hexanediol, 3-methyl- E ₆	—	—	18	—	—	—	—
1,3-hexanediol, 3-methyl- PO ₁	—	—	—	17	—	—	—
1,3-hexanediol, 4-methyl- E ₅	—	—	—	—	18	—	—
1,3-hexanediol, 4-methyl- PO ₁	—	—	—	—	—	17	—
1,3-hexanediol, 5-methyl- E ₅	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-hexanediol, 5-methyl- PO ₁	18	—	—	—	—	—	—
1,4-hexanediol (Me-E ₃)	—	18	—	—	—	—	—
1,4-hexanediol BO ₁	—	—	18	—	—	—	—
1,4-hexanediol PO ₂	—	—	—	17	—	—	—
1,4-hexanediol, 2-methyl- E ₆	—	—	—	—	18	—	—
1,4-hexanediol, 2-methyl- PO ₁	—	—	—	—	—	17	—
1,4-hexanediol, 3-methyl- E ₆	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-hexanediol, 3-methyl- PO ₁	18	—	—	—	—	—	—

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1,4-hexanediol, 4-methyl- E ₆	—	18	—	—	—	—	—
1,4-hexanediol, 4-methyl- PO ₁	—	—	18	—	—	—	—
1,4-hexanediol, 5-methyl- E ₆	—	—	—	17	—	—	—
1,4-hexanediol, 5-methyl- PO ₁	—	—	—	—	18	—	—
1,5-hexanediol (Me-E ₃)	—	—	—	—	—	17	—
1,5-hexanediol PO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXVII

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-hexanediol BO ₁	18	—	—	—	—	—	—
1,5-hexanediol, 2-methyl- E ₆	—	18	—	—	—	—	—
1,5-hexanediol, 2-methyl- PO ₁	—	—	18	—	—	—	—
1,5-hexanediol, 3-methyl- E ₆	—	—	—	17	—	—	—
1,5-hexanediol, 3-methyl- PO ₁	—	—	—	—	18	—	—
1,5-hexanediol, 4-methyl- E ₅	—	—	—	—	—	17	—
1,5-hexanediol, 4-methyl- PO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXVIII

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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1,5-hexanediol, 5-methyl- E ₅	18	—	—	—	—	—	—
1,5-hexanediol, 5-methyl- PO ₁	—	18	—	—	—	—	—
1,6-hexanediol (Me-E ₂)	—	—	18	—	—	—	—
1,6-hexanediol PO ₂	—	—	—	17	—	—	—
1,6-hexanediol, 2-methyl- E ₃	—	—	—	—	18	—	—
1,6-hexanediol, 3-methyl- E ₃	—	—	—	—	—	17	—
2,3-hexanediol E ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXIX

Component	1	2	3	4	5	6	7
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,3-hexanediol n-BO ₁	18	—	—	—	—	—	—
2,4-hexanediol (Me-E ₅)	—	18	—	—	—	—	—
2,4-hexanediol PO ₃	—	—	18	—	—	—	—
2,4-hexanediol, 2-methyl- (Me-E ₂)	—	—	—	17	—	—	—
2,4-hexanediol 2-methyl- PO ₂	—	—	—	—	18	—	—
2,4-hexanediol, 3-methyl- (Me-E ₂)	—	—	—	—	—	17	—
2,4-hexanediol 3-methyl- PO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXX

Component	1	2	3	4	5	6	7
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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2,4-hexanediol, 4-methyl- (Me-E ₂)	18	—	—	—	—	—	—
2,4-hexanediol 4-methyl-PO ₂	—	18	—	—	—	—	—
2,4-hexanediol, 5-methyl- (Me-E ₂)	—	—	18	—	—	—	—
2,4-hexanediol 5-methyl-PO ₂	—	—	—	17	—	—	—
2,5-hexanediol (Me-E ₅)	—	—	—	—	18	—	—
2,5-hexanediol PO ₃	—	—	—	—	—	17	—
2,5-hexanediol, 2-methyl- (Me-E ₂)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXI

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	—	26.6	—	20.0	20.0	20.0	20.0
DEQA ²	26	—	27	6.8	6.8	6.8	6.8
Ethanol	5	4	5.1	4	—	—	—
Isopropanol	—	—	—	2	—	—	—
2,5-hexanediol 2-methyl- PO ₂	18	—	—	—	—	—	—
2,5-hexanediol, 3-methyl- (Me-E ₂)	—	18	—	—	—	—	—
2,5-hexanediol 3-methyl- PO ₁	—	—	18	—	—	—	—
3,4-hexanediol E ₃	—	—	—	17	—	—	—
3,4-hexanediol n-BO ₁	—	—	—	—	18	—	—
4-ethyl-1,2-cyclopentanediol bis(2-hydroxy-cyclopentyl) ether	—	—	—	—	—	18	—
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXII

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26

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Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
4,4-dimethyl-1,2-cyclopentanediol	18	—	—	—	—	—	—
1,3-heptanediol E ₄	—	18	—	—	—	—	—
1,3-heptanediol PO ₁	—	—	18	—	—	—	—
1,3-heptanediol n-BO ₂	—	—	—	17	—	—	—
1,4-heptanediol E ₄	—	—	—	—	18	—	—
1,4-heptanediol PO ₁	—	—	—	—	—	17	—
1,4-heptanediol n-BO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXIII

Component	1	2	3	4	5	6	7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-heptanediol E ₄	18	—	—	—	—	—	—
1,5-heptanediol PO ₁	—	18	—	—	—	—	—
1,5-heptanediol n-BO ₂	—	—	18	—	—	—	—
1,6-heptanediol E ₄	—	—	—	17	—	—	—
1,6-heptanediol PO ₁	—	—	—	—	18	—	—
1,6-heptanediol n-BO ₂	—	—	—	—	—	17	—
1,7-heptanediol E ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXIV

Component	1	2	3	4	5	6	7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,7-heptanediol n-BO ₁	18	—	—	—	—	—	—
2,4-heptanediol E ₇	—	18	—	—	—	—	—
2,4-heptanediol (Me-E ₁)	—	—	18	—	—	—	—
2,4-heptanediol PO ₁	—	—	—	17	—	—	—
2,4-heptanediol n-BO ₃	—	—	—	—	18	—	—
2,5-heptanediol E ₇	—	—	—	—	—	17	—

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2,5-heptanediol (Me-E ₁)	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3-cyclooctene-1,2-diol	18	—	—	—	—	—	—
4-cyclooctene-1,2-diol	—	18	—	—	—	—	—
5-cyclooctene-1,2-diol	—	—	18	—	—	—	—
4-cyclohexene-1,2-diol, 3,6-dimethyl-	—	—	—	17	—	—	—
4-cyclohexene-1,2-diol, 4,5-dimethyl-	—	—	—	—	18	—	—
1,2-Cyclobutanediol, 1- ethenyl-2-ethyl-	—	—	—	—	—	17	—
3-Cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3-Cyclobutene-1,2-diol, 3,4-diethyl-	18	—	—	—	—	—	—
3-Cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-	—	18	—	—	—	—	—
3-Cyclobutene-1,2-diol, 3-butyl-	—	—	18	—	—	—	—
1,2-Cyclopentanediol, 1,2-dimethyl-4- methylene-	—	—	—	17	—	—	—
1,2-Cyclopentanediol, 1- ethyl-3-methylene-	—	—	—	—	18	—	—

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1,2-Cyclopentanediol, 4-(1-propenyl)	—	—	—	—	—	17	—
3-Cyclopentene-1,2-diol, 1-ethyl-3-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-Cyclohexanediol, 1-ethenyl-	18	—	—	—	—	—	—
1,2-Cyclohexanediol, 1-methyl-3-methylene-	—	18	—	—	—	—	—
1,2-Cyclohexanediol, 1-methyl-4-methylene-	—	—	18	—	—	—	—
1,2-Cyclohexanediol, 3-ethenyl-	—	—	—	17	—	—	—
1,2-Cyclohexanediol, 4-ethenyl-	—	—	—	—	18	—	—
3-Cyclohexene-1,2-diol, 2,6-dimethyl-	—	—	—	—	—	17	—
3-Cyclohexene-1,2-diol, 6,6-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁶	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-Propanediol, 2,2-di-2-propenyl-	18	—	—	—	—	—	—
1,3-Propanediol, 2-(1-pentenyl)-	—	18	—	—	—	—	—

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1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-	—	—	18	—	—	—	—
1,3-Propanediol, 2-(3-methyl-1-butenyl)-	—	—	—	17	—	—	—
1,3-Propanediol, 2-(4-pentenyl)-	—	—	—	—	18	—	—
1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-	—	—	—	—	—	17	—
1,3-Propanediol, 2-ethyl-2-(2-propenyl)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXIX

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-	18	—	—	—	—	—	—
1,3-Butanediol, 2,2-diallyl-	—	18	—	—	—	—	—
1,3-Butanediol, 2-(1-ethyl-1-propenyl)-	—	—	18	—	—	—	—
1,3-Butanediol, 2-(2-butenyl)-2-methyl-	—	—	—	17	—	—	—
1,3-Butanediol, 2-(3-methyl-2-butenyl)-	—	—	—	—	18	—	—
1,3-Butanediol, 2-ethyl-2-(2-propenyl)-	—	—	—	—	—	17	—
1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXX

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—

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DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-Butanediol, 2,3-bis(1-methylethylidene)-	18	—	—	—	—	—	—
1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-	—	18	—	—	—	—	—
2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-	—	—	18	—	—	—	—
2-Butene-1,4-diol, 2-(1-methylpropyl)-	—	—	—	17	—	—	—
2-Butene-1,4-diol, 2-butyl-	—	—	—	—	18	—	—
1,3-Pentanediol, 2-ethenyl-3-ethyl-	—	—	—	—	—	17	—
1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXI

[illegible]

EXAMPLE LXXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-	18	—	—	—	—	—	—
1,4-Hexanediol, 4-ethyl-2-methylene-	—	18	—	—	—	—	—
1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-	—	—	18	—	—	—	—
1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-	—	—	—	17	—	—	—
1,5-Hexanediol, 2-(1-methylethenyl)-	—	—	—	—	18	—	—
1,6-Hexanediol, 2-ethenyl-	—	—	—	—	—	17	—
1-Hexene-3,4-diol, 5,5-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1-Hexene-3,4-diol, 5,5-dimethyl-	18	—	—	—	—	—	—
2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-	—	18	—	—	—	—	—
3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-	—	—	18	—	—	—	—
3-Hexene-1,6-diol, 2-ethyl-	—	—	—	17	—	—	—
3-Hexene-1,6-diol, 3,4-dimethyl-	—	—	—	—	18	—	—
4-Hexene-2,3-diol, 2,5-dimethyl-	—	—	—	—	—	17	—
4-Hexene-2,3-diol, 3,4-dimethyl-	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁶	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
5-Hexene-1,3-diol, 3-(2-propenyl)-	18	—	—	—	—	—	—
5-Hexene-2,3-diol, 2,3-dimethyl-	—	18	—	—	—	—	—
5-Hexene-2,3-diol, 3,4-dimethyl-	—	—	18	—	—	—	—
5-Hexene-2,3-diol, 3,5-dimethyl-	—	—	—	17	—	—	—
5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-	—	—	—	—	18	—	—
1,4-Heptanediol, 6-methyl-5-methylene-	—	—	—	—	—	17	—
1,5-Heptadiene-3,4-diol, 2,3-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-Heptadiene-3,4-diol, 2,5-dimethyl-	18	—	—	—	—	—	—
1,5-Heptadiene-3,4-diol, 3,5-dimethyl-	—	18	—	—	—	—	—
1,7-Heptanediol, 2,6-bis(methylene)-	—	—	18	—	—	—	—
1,7-Heptanediol, 4-methylene-	—	—	—	17	—	—	—

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1-Heptene-3,5-diol, 2,4-dimethyl-	—	—	—	—	18	—	—
1-Heptene-3,5-diol, 2,6-dimethyl-	—	—	—	—	—	17	—
1-Heptene-3,5-diol, 3-ethenyl-5-methyl	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXVI

Component	1	2	3	4	5	6	7
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1-Heptene-3,5-diol, 6,6-dimethyl-	18	—	—	—	—	—	—
2,4-Heptadiene-2,6-diol, 4,6-dimethyl-	—	18	—	—	—	—	—
2,5-Heptadiene-1,7-diol, 4,4-dimethyl-	—	—	18	—	—	—	—
2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-	—	—	—	17	—	—	—
2-Heptene-1,4-diol, 5,6-dimethyl-	—	—	—	—	18	—	—
2-Heptene-1,5-diol, 5-ethyl-	—	—	—	—	—	17	—
2-Heptene-1,7-diol, 2-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXVII

Component	1	2	3	4	5	6	7
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3-Heptene-1,5-diol, 4,6-dimethyl-	18	—	—	—	—	—	—

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3-Heptene-1,7-diol, 3-methyl-6-methylene-	—	18	—	—	—	—	—
3-Heptene-2,5-diol, 2,4-dimethyl-	—	—	18	—	—	—	—
3-Heptene-2,5-diol, 2,5-dimethyl-	—	—	—	17	—	—	—
3-Heptene-2,6-diol, 2,6-dimethyl-	—	—	—	—	18	—	—
3-Heptene-2,6-diol, 4,6-dimethyl-	—	—	—	—	—	17	—
5-Heptene-1,3-diol, 2,4-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
5-Heptene-1,3-diol, 3,6-dimethyl-	18	—	—	—	—	—	—
5-Heptene-1,4-diol, 2,6-dimethyl-	—	18	—	—	—	—	—
5-Heptene-1,4-diol, 3,6-dimethyl-	—	—	18	—	—	—	—
5-Heptene-2,4-diol, 2,3-dimethyl-	—	—	—	17	—	—	—
6-Heptene-1,3-diol, 2,2-dimethyl-	—	—	—	—	18	—	—
6-Heptene-1,4-diol, 4-(2-propenyl)-	—	—	—	—	—	17	—
6-Heptene-1,4-diol, 5,6-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26

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[illegible]

EXAMPLE LXXXX

[illegible]

EXAMPLE LXXXXXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-Octadiene-1,7-diol, 3,7-dimethyl-	18	—	—	—	—	—	—
2,5-Octadiene-1,7-diol, 2,6-dimethyl-	—	18	—	—	—	—	—
2,5-Octadiene-1,7-diol, 3,7-dimethyl-	—	—	18	—	—	—	—
2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol)	—	—	—	17	—	—	—
2,6-Octadiene-1,8-diol, 2-methyl-	—	—	—	—	18	—	—
2,7-Octadiene-1,4-diol, 3,7-dimethyl-	—	—	—	—	—	17	—
2,7-Octadiene-1,5-diol, 2,6-dimethyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8- Hydroxylinalool)	18	—	—	—	—	—	—
2,7-Octadiene-1,6-diol, 2,7-dimethyl-	—	18	—	—	—	—	—
2-Octene-1,4-diol	—	—	18	—	—	—	—
2-Octene-1,7-diol	—	—	—	17	—	—	—
2-Octene-1,7-diol, 2- methyl-6-methylene-	—	—	—	—	18	—	—
1,4-pentanediol, 2,2,4- trimethyl- n-BO ₁	—	—	—	—	—	17	—
3,5-Octadiene-1,7-diol, 3,7-dimethyl-	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXIII

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3,5-Octadiene-2,7-diol, 2,7-dimethyl-	18	—	—	—	—	—	—
3,5-Octanediol, 4- methylene-	—	18	—	—	—	—	—
3,7-Octadiene-1,6-diol, 2,6-dimethyl-	—	—	18	—	—	—	—
3,7-Octadiene-2,5-diol, 2,7-dimethyl-	—	—	—	17	—	—	—
3,7-Octadiene-2,6-diol, 2,6-dimethyl-	—	—	—	—	18	—	—
3-Octene-1,5-diol, 4- methyl-	—	—	—	—	—	17	—
3-Octene-1,5-diol, 5- methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXIV

Component	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
4,6-Octadiene-1,3-diol, 2,2-dimethyl-	18	—	—	—	—	—	—
4,7-Octadiene-2,3-diol, 2,6-dimethyl-	—	18	—	—	—	—	—
4,7-Octadiene-2,6-diol, 2,6-dimethyl-	—	—	18	—	—	—	—
4-Octene-1,6-diol, 7- methyl-	—	—	—	17	—	—	—

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1,4-pentanediol, 2,3,3-trimethyl- n-BO ₁	—	—	—	—	18	—	—
4-Octene-1,8-diol, 2,7-bis(methylene)-	—	—	—	—	—	17	—
4-Octene-1,8-diol, 2-methylene-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
5,7-Octadiene-1,4-diol, 2,7-dimethyl-	18	—	—	—	—	—	—
5,7-Octadiene-1,4-diol, 7-methyl-	—	18	—	—	—	—	—
5-Octene-1,3-diol	—	—	18	—	—	—	—
6-Octene-1,3-diol, 7-methyl-	—	—	—	17	—	—	—
6-Octene-1,4-diol, 7-methyl-	—	—	—	—	18	—	—
6-Octene-1,5-diol	—	—	—	—	—	17	—
6-Octene-1,5-diol, 7-methyl-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
6-Octene-3,5-diol, 2-methyl-	18	—	—	—	—	—	—
6-Octene-3,5-diol, 4-methyl-	—	18	—	—	—	—	—

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7-Octene-1,3-diol, 2-methyl-	—	—	18	—	—	—	—
7-Octene-1,3-diol, 4-methyl-	—	—	—	17	—	—	—
7-Octene-1,3-diol, 7-methyl-	—	—	—	—	18	—	—
7-Octene-1,5-diol	—	—	—	—	—	17	—
7-Octene-1,6-diol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
7-Octene-1,6-diol, 5-methyl-	18	—	—	—	—	—	—
7-Octene-2,4-diol, 2-methyl-6-methylene-	—	18	—	—	—	—	—
7-Octene-2,5-diol, 7-methyl-	—	—	18	—	—	—	—
7-Octene-3,5-diol, 2-methyl-	—	—	—	17	—	—	—
1-Nonene-3,5-diol	—	—	—	—	18	—	—
1-Nonene-3,7-diol	—	—	—	—	—	17	—
1-Nonene-3,7-diol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE LXXXXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3-Nonene-2,5-diol	18	—	—	—	—	—	—
3-Nonene-2,5-diol	—	18	—	—	—	—	—
4,6-Nonadiene-1,3-diol, 8-methyl-	—	—	18	—	—	—	—

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4-Nonene-2,8-diol	—	—	—	17	—	—	—
6,8-Nonadiene-1,5-diol	—	—	—	—	18	—	—
7-Nonene-2,4-diol	—	—	—	—	—	17	—
8-Nonene-2,4-diol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE IC

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
8-Nonene-2,5-diol	18	—	—	—	—	—	—
1,9-Decadiene-3,8-diol	—	18	—	—	—	—	—
1,9-Decadiene-4,6-diol	—	—	18	—	—	—	—
bis(2-hydroxy-cyclopentyl)ether	—	—	—	17	—	—	—
1,2-propanediol, 3-butyloxy-, dibutyleneoxylated	—	—	—	—	18	—	—
1,2-propanediol, 3-butyloxy-, tributyleneoxylated	—	—	—	—	—	17	—
1-(3-methylphenyl)-1,3-propanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE C

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1-(4-methylphenyl)-1,3-propanediol	18	—	—	—	—	—	—
2-methyl-1-phenyl-1,3-propanediol	—	18	—	—	—	—	—
1,2-propanediol, 3-(cyclohexyloxy)-	—	—	18	—	—	—	—

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1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-	—	—	—	17	—	—	—
1,3-propanediol, 2-(pentyloxy)-	—	—	—	—	18	—	—
1,3-propanediol, 2-(2-pentyloxy)-	—	—	—	—	—	17	—
1,3-propanediol, 2-(3-pentyloxy)-	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-(2-methyl-1-butyloxy)-	18	—	—	—	—	—	—
1,3-propanediol, 2-(isoamyloxy)-	—	18	—	—	—	—	—
1,3-propanediol, 2-(3-methyl-2-butyloxy)-	—	—	18	—	—	—	—
1,3-propanediol, 2-(cyclohexyloxy)-	—	—	—	17	—	—	—
1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-	—	—	—	—	18	—	—
1,2-propanediol, 3-(butyloxy)-, triethoxylated	—	—	—	—	—	17	—
1,2-propanediol, 3-(butyloxy)-, tetraethoxylated	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁶	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

[illegible]

EXAMPLE CIII

[illegible]

EXAMPLE CIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,6-dimethyl-1,3-cyclohexanediol	18	—	—	—	—	—	—
1-hydroxy-cyclohexanecethanol	—	18	—	—	—	—	—
1-hydroxy-cyclohexanemethanol	—	—	18	—	—	—	—
1-ethyl-1,3-cyclohexanediol	—	—	—	17	—	—	—
1-methyl-1,2-cyclohexanediol	—	—	—	—	18	—	—
2,2-dimethyl-1,3-cyclohexanediol	—	—	—	—	—	17	—
2,3-dimethyl-1,4-cyclohexanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-dimethyl-1,3-cyclohexanediol	18	—	—	—	—	—	—
2,5-dimethyl-1,3-cyclohexanediol	—	18	—	—	—	—	—
2,6-dimethyl-1,4-cyclohexanediol	—	—	18	—	—	—	—
2-ethyl-1,3-cyclohexanediol	—	—	—	17	—	—	—
2-hydroxycyclohexanecethanol	—	—	—	—	18	—	—
2-hydroxyethyl-1-cyclohexanol	—	—	—	—	—	17	—
2-hydroxymethyl-cyclohexanol	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)

DI Water

0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

ComponentEXAMPLE CVI

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
3-hydroxyethyl-1-cyclohexanol	18	—	—	—	—	—	—
3-hydroxycyclohexane-ethanol	—	18	—	—	—	—	—
3-hydroxymethyl-cyclohexanol	—	—	18	—	—	—	—
3-methyl-1,2-cyclohexanediol	—	—	—	17	—	—	—
4,4-dimethyl-1,3-Cyclohexanediol	—	—	—	—	18	—	—
4,5-dimethyl-1,3-cyclohexanediol	—	—	—	—	—	17	—
4,6-dimethyl-1,3-cyclohexanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

ComponentEXAMPLE CVII

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
4-ethyl-1,3-cyclohexanediol	18	—	—	—	—	—	—
4-hydroxyethyl-1-cyclohexanol	—	18	—	—	—	—	—
4-hydroxymethyl-cyclohexanol	—	—	18	—	—	—	—
4-methyl-1,2-cyclohexanediol	—	—	—	17	—	—	—

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5,5-dimethyl-1,3-cyclohexanediol	—	—	—	—	18	—	—
5-ethyl-1,3-cyclohexanediol	—	—	—	—	—	17	—
1,2-cycloheptanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁶	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2-methyl-1,3-cycloheptanediol	18	—	—	—	—	—	—
2-methyl-1,4-cycloheptanediol	—	18	—	—	—	—	—
4-methyl-1,3-cycloheptanediol	—	—	18	—	—	—	—
5-methyl-1,3-cycloheptanediol	—	—	—	17	—	—	—
5-methyl-1,4-cycloheptanediol	—	—	—	—	18	—	—
6-methyl-1,4-cycloheptanediol	—	—	—	—	—	17	—
1,3-cyclooctanediol	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-cyclooctanediol	18	—	—	—	—	—	—
1,5-cyclooctanediol	—	18	—	—	—	—	—
1,2-cyclohexanediol, diethoxylate	—	—	18	—	—	—	—

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1,2-cyclohexanediol, triethoxylate	—	—	—	17	—	—	—
1,2-cyclohexanediol, tetraethoxylate	—	—	—	—	18	—	—
1,2-cyclohexanediol, pentaethoxylate	—	—	—	—	—	17	—
1,2-cyclohexanediol, hexaethoxylate	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,2-cyclohexanediol, heptaethoxylate	18	—	—	—	—	—	—
1,2-cyclohexanediol, octaethoxylate	—	18	—	—	—	—	—
1,2-cyclohexanediol, nonaethoxylate	—	—	18	—	—	—	—
1,2-cyclohexanediol, monopropoxylate	—	—	—	17	—	—	—
1,2-cyclohexanediol, monobutylnoxylate	—	—	—	—	18	—	—
1,2-cyclohexanediol, dibutylnoxylate	—	—	—	—	—	17	—
1,2-cyclohexanediol, tributylnoxylate	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁴	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	2.3	6	6	6	—	4	6
Isopropanol	—	—	—	—	6	2	—
1,2-hexanediol	16	—	—	8	—	—	—
1-phenyl-1,2-propanediol	—	18	—	—	—	—	—

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2-phenyl-1,2-propanediol	---	---	18	8	---	---	---
3-phenyl-1,2-propanediol	---	---	---	---	18	---	---
1-(3-methylphenyl)-1,3-propanediol	---	---	---	---	---	18	---
1-(4-methylphenyl)-1,3-propanediol	---	---	---	---	---	---	18
MgCl ₂	0.125	---	---	---	---	---	---
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	---	---	26	26	---
DEQA ⁶	---	---	26	26	---	---	26
Ethanol	6	6	6	6	---	4	6
Isopropanol	---	---	---	---	6	2	---
2-methyl-1-phenyl-1,3-propanediol	18	---	---	---	---	---	---
1-phenyl-1,3-butanediol	---	18	---	---	---	---	---
3-phenyl-1,3-butanediol	---	---	18	---	---	---	---
1-phenyl-1,4-butanediol	---	---	---	18	---	---	---
2-phenyl-1,4-butanediol	---	---	---	---	18	---	---
1-phenyl-2,3-butanediol	---	---	---	---	---	18	---
1,2-propanediol, 3-phenyloxy-	---	---	---	---	---	---	18
MgCl ₂	0.125	---	---	---	---	---	---
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	---	---	26.6	26.6	---
DEQA ²	---	---	26.6	26.6	---	---	26.6
Ethanol	4	6	4	6	---	4	6
Isopropanol	---	---	---	---	6	2	---
Propylene carbonate	2	---	2	---	---	---	---
1,2-propanediol, 3-benzyloxy-	18	---	---	---	---	---	---

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1,2-propanediol, 3-(2-phenylethoxy)-	---	18	---	---	---	---	---
1,2-propanediol, 3-(1-phenyl-2-propyloxy)-	---	---	18	---	---	---	---
1,3-propanediol, 2-phenyloxy-	---	---	---	18	---	---	---
1,3-propanediol, 2-(m-cresyloxy)-	---	---	---	---	18	---	---
1,3-propanediol, 2-(p-cresyloxy)-	---	---	---	---	---	18	---
1,3-propanediol, 2-benzyloxy-	---	---	---	---	---	---	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-(2-phenylethoxy)-	18	---	---	---	---	---	---
1,3-propanediol, 2-(1-phenylethoxy)-	---	18	---	---	---	---	---
1,3-butanediol, 3-methyl-2-isopropyl- PO ₁	---	---	18	---	---	---	---
2,4-pentanediol, 2,3,3-trimethyl- PO ₁	---	---	---	17	---	---	---
1,3-butanediol, 2,2-diethyl- n-BO ₂	---	---	---	---	18	---	---
1,3-butanediol, 2,2-diethyl- E ₄	---	---	---	---	---	17	---
1,3-butanediol, 2-ethyl-2,3-dimethyl n-BO ₁	---	---	---	---	---	---	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—

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DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 2-methyl-2-isopropyl- n-BO ₁	18	—	—	—	—	—	—
1,3-pentanediol, 2,2,3-trimethyl- n-BO ₁	—	18	—	—	—	—	—
1,3-pentanediol, 2,2,4-trimethyl- n-BO ₁	—	—	18	—	—	—	—
2,4-hexanediol, 2,3-dimethyl- n-BO ₂	—	—	—	17	—	—	—
2,4-hexanediol, 2,3-dimethyl- E ₄	—	—	—	—	18	—	—
2,4-hexanediol, 2,4-dimethyl- n-BO ₁	—	—	—	—	—	17	—
2,4-hexanediol, 2,4-dimethyl- E ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXVI

Component	1	2	3	4	5	6	7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-hexanediol, 2,5-dimethyl- n-BO ₂	18	—	—	—	—	—	—
2,4-hexanediol, 2,5-dimethyl- E ₄	—	18	—	—	—	—	—
2,4-hexanediol, 3,3-dimethyl- n-BO ₂	—	—	18	—	—	—	—
2,4-hexanediol, 3,3-dimethyl- E ₃	—	—	—	17	—	—	—
2,4-hexanediol, 3,4-dimethyl- n-BO ₂	—	—	—	—	18	—	—
2,4-hexanediol, 3,4-dimethyl- E ₄	—	—	—	—	—	17	—
2,4-hexanediol, 3,5-dimethyl- n-BO ₁	—	—	—	—	—	—	18

HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ²	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-hexanediol, 3,5-dimethyl- E ₃	18	—	—	—	—	—	—
2,4-hexanediol, 4,5-dimethyl- n-BO ₂	—	18	—	—	—	—	—
2,4-hexanediol, 4,5-dimethyl- E ₄	—	—	18	—	—	—	—
2,4-hexanediol, 5,5-dimethyl- n-BO ₂	—	—	—	17	—	—	—
2,4-hexanediol, 5,5-dimethyl- E ₃	—	—	—	—	18	—	—
2,5-hexanediol, 2,3-dimethyl- n-BO ₁	—	—	—	—	—	17	—
2,5-hexanediol, 2,3-dimethyl- E ₄	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,5-hexanediol, 2,4-dimethyl- n-BO ₁	17	—	—	—	—	—	—
2,5-hexanediol, 2,4-dimethyl- E ₄	—	18	—	—	—	—	—
2,5-hexanediol, 2,5-dimethyl- n-BO ₂	—	—	18	—	—	—	—

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2,5-hexanediol, 2,5-dimethyl- E ₄	---	---	---	18	---	---	---
2,5-hexanediol, 3,3-dimethyl- n-BO ₁	---	---	---	---	17	---	---
2,5-hexanediol, 3,3-dimethyl- E ₄	---	---	---	---	---	18	---
2,5-hexanediol, 3,4-dimethyl- n-BO ₂	---	---	---	---	---	---	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,5-hexanediol, 3,4-dimethyl- E ₄	18	—	—	—	—	—	—
3,5-heptanediol, 3-methyl- n-BO ₁	—	18	—	—	—	—	—
3,5-heptanediol, 3-methyl- E ₃	—	—	18	—	—	—	—
1,3-propanediol, 2-(1,2-dimethylpropyl)- E ₃	—	—	—	17	—	—	—
1,3-butanediol, 2-ethyl-2,3-dimethyl- E ₃	—	—	—	—	18	—	—
1,3-butanediol, 2-methyl-2-isopropyl- E ₃	—	—	—	—	—	17	—
1,4-butanediol, 3-methyl-2-isopropyl- E ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—

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PCT/US96/11856

EXAMPLE CXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-heptanediol, 2-methyl- E ₂	18	—	—	—	—	—	—
2,4-heptanediol, 3-methyl- E ₂	—	18	—	—	—	—	—
2,4-heptanediol, 4-methyl- E ₂	—	—	18	—	—	—	—
2,4-heptanediol, 5-methyl- E ₂	—	—	—	17	—	—	—
2,4-heptanediol, 6-methyl- E ₂	—	—	—	—	18	—	—
2,5-heptanediol, 2-methyl- E ₂	—	—	—	—	—	17	—
2,5-heptanediol, 3-methyl- E ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,5-heptanediol, 4-methyl- E ₂	18	—	—	—	—	—	—
2,5-heptanediol, 5-methyl- E ₂	—	18	—	—	—	—	—
2,5-heptanediol, 6-methyl- E ₂	—	—	18	—	—	—	—
2,6-heptanediol, 2-methyl- E ₂	—	—	—	17	—	—	—
2,6-heptanediol, 3-methyl- E ₂	—	—	—	—	18	—	—
2,6-heptanediol, 4-methyl- E ₂	—	—	—	—	—	17	—

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3,5-heptanediol, 2-methyl- E ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXIV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-butanediol, 3-methyl-2-isopropyl- n-BO ₁	18	—	—	—	—	—	—
1,4-pentanediol, 2,2,3-trimethyl- n-BO ₁	—	18	—	—	—	—	—
2,4-hexanediol, 4-ethyl- n-BO ₁	—	—	18	—	—	—	—
2,4-hexanediol, 4-ethyl- n-BO ₁	—	—	—	17	—	—	—
2,4-heptanediol, 2-methyl- n-BO ₁	—	—	—	—	18	—	—
2,4-heptanediol, 3-methyl- n-BO ₁	—	—	—	—	—	17	—
2,4-heptanediol, 4-methyl- n-BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,4-heptanediol, 5-methyl- n-BO ₁	18	—	—	—	—	—	—
2,4-heptanediol, 6-methyl- n-BO ₁	—	18	—	—	—	—	—

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2,5-heptanediol, 2-methyl- n-BO ₁	---	---	18	---	---	---	---
2,5-heptanediol, 3-methyl- n-BO ₁	---	---	---	17	---	---	---
2,5-heptanediol, 4-methyl- n-BO ₁	---	---	---	---	18	---	---
2,5-heptanediol, 5-methyl- n-BO ₁	---	---	---	---	---	17	---
2,5-heptanediol, 6-methyl- n-BO ₁	---	---	---	---	---	---	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,6-heptanediol, 2-methyl- n-BO ₁	18	—	—	—	—	—	—
2,6-heptanediol, 3-methyl- n-BO ₁	—	18	—	—	—	—	—
2,6-heptanediol, 4-methyl- n-BO ₁	—	—	18	—	—	—	—
3,5-heptanediol, 2-methyl- (C8) n-BO ₁	—	—	—	17	—	—	—
1,2-hexanediol	—	—	—	—	8	8	8
1,3-pentanediol, 2,2,4-trimethyl-	—	—	—	—	8	—	—
1,3-hexanediol, 2-ethyl-	—	—	—	—	—	8	8
Perfume	1.2	1.35	1.2	1.35	1.2	1.35	1.3
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26.6	26.6	—
DEQA ⁵	—	—	26	26	—	—	26
Ethanol	4	2.3	6	4	—	4	2

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[illegible]

EXAMPLE CXXVIII

[illegible]

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EXAMPLE CXXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁸ (Hydroxyethyl Ester Quat)	29.8	29.8	29.8	—	29.8	29.8	—
DEQA ⁹ (Propyl Ester Quat)	—	—	—	29.6	—	—	29.6
Ethanol	2	2	2	—	—	3	2
Isopropanol	—	—	—	2	2	—	—
1,2-hexanediol	16	—	—	17	8	8	8
1,3-hexanediol, 2-ethyl-	—	16	—	—	8	—	8
1,3-pentanediol, 2,2,4-trimethyl-	—	—	16	—	—	8	—
CaCl ₂	—	0.125	—	—	—	—	—
MgCl ₂	—	—	0.125	—	—	—	—
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

DEQA⁸ Di(acyloxyethyl) (2-hydroxyethyl) methyl ammonium methyl sulfate wherein the acyl group is the same as that of DEQA¹, about 89.4% active in ethanol.

DEQA⁹ 1,2-Di(oleoyloxy)-3-trimethylammoniopropane chloride wherein the acyl group is the same as that of DEQA⁵, about 88% active in ethanol.

EXAMPLE CXXX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	4	—	4
1,2-hexanediol	9	8	10	8	—	10	9
1,3-propanediol, 2,2,4-trimethyl-	—	—	—	—	9	—	—
1,2-propanediol, 3-(n-pentyloxy)-	8	—	—	—	—	—	—
1,2-propanediol, 3-cyclohexyloxy-	—	8	—	—	—	—	—
bis(2-hydroxybutyl) ether	—	—	6	—	—	—	—
1,2-propanediol, 3-benzyloxy-	—	—	—	8	—	—	—
1,2-bis(hydroxymethyl)-cyclohexane	—	—	—	—	8	—	—

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1,2-propanediol, 2-phenyl-	—	—	—	—	—	—	—
2,6-octadiene-1,4-diol,	—	—	—	—	—	—	—
3,7-dimethyl-	—	—	—	—	—	—	8
CaCl ₂	—	—	—	—	—	0.25	—
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,5-heptanediol PO ₁	18	—	—	—	—	—	—
2,5-heptanediol n-BO ₃	—	18	—	—	—	—	—
2,6-heptanediol E ₇	—	—	18	—	—	—	—
2,6-heptanediol (Mc-E ₁)	—	—	—	17	—	—	—
2,6-heptanediol PO ₁	—	—	—	—	18	—	—
2,6-heptanediol n-BO ₃	—	—	—	—	—	17	—
2,7-heptanediol E ₇	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁶	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
2,7-heptanediol (Mc-E ₁)	18	—	—	—	—	—	—
2,7-heptanediol PO ₁	—	18	—	—	—	—	—
2,7-heptanediol n-BO ₃	—	—	18	—	—	—	—
1,3-propanediol, 2,2-diethyl- n-BO ₂	—	—	—	17	—	—	—
1,3-propanediol, 2-(1-methylpropyl)- n-BO ₂	—	—	—	—	18	—	—
1,3-propanediol, 2-(2-methylpropyl)- n-BO ₂	—	—	—	—	—	17	—
1,3-butanediol, 2-ethyl-2-methyl- n-BO ₃	—	—	—	—	—	—	18

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HCl (pH about 2-3.5)

DI Water

0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXIII

Component	1	2	3	4	5	6	7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-propanediol, 2-methyl-2-isopropyl- n-BO ₂	18	—	—	—	—	—	—
1,3-propanediol, 2-methyl-2-propyl- n-BO ₂	—	18	—	—	—	—	—
1,2-butanediol (Me-E ₆)	—	—	18	—	—	—	—
1,2-butanediol PO ₂	—	—	—	17	—	—	—
1,2-butanediol BO ₁	—	—	—	—	18	—	—
1,2-butanediol, 2,3-dimethyl E ₄	—	—	—	—	—	17	—
1,2-butanediol, 2,3-dimethyl n-BO ₁	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXIV

Component	1	2	3	4	5	6	7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ³	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,3-butanediol, 2-ethyl-3-methyl- n-BO ₃	18	—	—	—	—	—	—
1,3-butanediol, 2-isopropyl- n-BO ₃	—	18	—	—	—	—	—
1,3-butanediol, 2-propyl- n-BO ₃	—	—	18	—	—	—	—
1,4-butanediol, 2,2,3-trimethyl- n-BO ₂	—	—	—	17	—	—	—
1,4-butanediol, 2-ethyl-2-methyl- n-BO ₂	—	—	—	—	18	—	—

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1,4-butanediol, 2-ethyl-3-methyl- n-BO ₂	—	—	—	—	—	17	—
1,4-butanediol, 2-isopropyl- n-BO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXV

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ⁵	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-butanediol, 2-propyl-n-BO ₁	18	—	—	—	—	—	—
1,3-pentanediol, 2,4-dimethyl- n-BO ₃	—	18	—	—	—	—	—
1,3-pentanediol, 2-ethyl-n-BO ₂	—	—	18	—	—	—	—
1,3-pentanediol, 3,4-dimethyl- n-BO ₃	—	—	—	17	—	—	—
1,3-pentanediol, 4,4-dimethyl- n-BO ₃	—	—	—	—	18	—	—
1,3-pentanediol, 4-methyl- (Me-E ₅)	—	—	—	—	—	17	—
1,4-pentanediol, 2,2-dimethyl- n-BO ₃	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXVI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,4-pentanediol, 2,3-dimethyl- n-BO ₃	18	—	—	—	—	—	—
1,4-pentanediol, 2,4-dimethyl- n-BO ₃	—	18	—	—	—	—	—

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1,4-pentanediol, 3,3-dimethyl- n-BO ₃	—	—	18	—	—	—	—
1,4-pentanediol, 3,4-dimethyl- n-BO ₃	—	—	—	17	—	—	—
1,5-pentanediol, 2,2-dimethyl- n-BO ₂	—	—	—	—	18	—	—
1,5-pentanediol, 2,3-dimethyl- n-BO ₂	—	—	—	—	—	17	—
1,5-pentanediol, 2,4-dimethyl- n-BO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXVII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ³	26.6	26.6	—	—	26	26	—
DEQA ¹	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6
Isopropanol	2	—	—	—	6	2	—
1,5-pentanediol, 2-ethyl- n-BO ₁	18	—	—	—	—	—	—
1,5-pentanediol, 3,3-dimethyl- n-BO ₂	—	8	—	—	—	—	—
1,3-hexanediol, 2-methyl- n-BO ₂	—	—	18	—	—	—	—
1,3-hexanediol, 3-methyl- n-BO ₂	—	—	—	17	—	—	—
1,3-hexanediol, 4-methyl- n-BO ₂	—	—	—	—	18	—	—
1,3-hexanediol, 5-methyl- n-BO ₂	—	—	—	—	—	17	—
1,4-hexanediol, 2-methyl- n-BO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXVIII

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	26.6	26.6	—	—	26	26	—
DEQA ⁴	—	—	26	26	—	—	26
Ethanol	4	6	6	6	—	4	6

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Isopropanol	2	—	—	—	6	2	—
1,4-hexanediol, 3-methyl- n-BO ₂	18	—	—	—	—	—	—
1,4-hexanediol, 4-methyl- n-BO ₂	—	18	—	—	—	—	—
1,4-hexanediol, 5-methyl- n-BO ₂	—	—	18	—	—	—	—
1,5-hexanediol, 2-methyl- n-BO ₂	—	—	—	17	—	—	—
1,5-hexanediol, 3-methyl- n-BO ₂	—	—	—	—	18	—	—
1,5-hexanediol, 4-methyl- n-BO ₂	—	—	—	—	—	17	—
1,5-hexanediol, 5-methyl- n-BO ₂	—	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXIX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ²	26.6	26.6	—	26.6	26.6	—
DEQA ⁵	—	—	26	—	—	26
Ethanol	4	6	6	4	6	6
Isopropanol	2	—	—	2	—	—
1,6-hexanediol, n-BO ₄	18	—	—	—	—	—
1,6-hexanediol, 2-methyl- n-BO ₁	—	18	—	—	—	—
1,6-hexanediol, 3-methyl- n-BO ₁	—	—	18	—	—	—
1,4-pentanediol, 2,3,4-dimethyl-	—	—	—	18	—	—
1,4-pentanediol, 2,3,4-dimethyl- n-BO ₁	—	—	—	—	18	—
1,4-pentanediol, 2,3,4-dimethyl- E ₃	—	—	—	—	—	18
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

EXAMPLE CXXXX

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹	—	9.1	—	9.1	—	—	—
DEQA ⁵	—	—	9.1	—	9.1	—	—

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DEQA ¹⁰	17.7	—	—	—	—	—	—
DEQA ¹¹	8.3	—	—	—	—	—	—
DEQA ¹²	—	16.9	16.9	—	—	—	—
DEQA ¹³	—	—	—	16.9	—	—	—
DEQA ¹⁴	—	—	—	—	16.9	—	—
DEQA ¹⁵	—	—	—	—	—	26	—
DEQA ¹⁶	—	—	—	—	—	—	26
Ethanol	6.6	6.6	6.6	6.6	6.6	6.6	6.6
1,2-hexanediol	17	17	17	17	17	17	17
HCl (pH about 2-3.5)	0.005	0.005	0.005	0.005	0.005	0.005	0.005
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

DEQA¹⁵: N,N-di(acyloxyethyl)-N,N-dimethyl ammonium chloride, wherein acyl group is derived from a mixture of partially hydrogenated soya fatty acid (fatty acid of DEQA¹⁰) and slightly hydrogenated tallow fatty acid (fatty acid of DEQA¹¹) at an approximate 65:35 weight ratio.

DEQA¹⁶: N,N-di(acyloxyethyl)-N,N-dimethyl ammonium chloride, wherein acyl group is derived from a mixture of fatty acid of DEQA¹ and isostearic acid of DEQA¹² at an approximate 65:35 weight ratio.

In mixed branched chain and unsaturated chain DEQAs, where R¹ is a long chain C₅-C₂₁ (or C₆-C₂₂), preferably C₁₀-C₂₀ (or C₉-C₁₉) branched alkyl or unsaturated alkyl, most preferably C₁₂-C₁₈ (or C₁₁-C₁₇) branched alkyl and unsaturated alkyl, the ratio of branched alkyl to unsaturated alkyl is preferably from about 95:5 to about 5:95, more preferably from about 75:25 to about 25:75, and even more preferably from about 50:50 to about 30:70, and for the unsaturated alkyl group, the Iodine Value of the parent fatty acid of this R¹ group is preferably from about 20 to about 140, more preferably from about 50 to about 130; and most preferably from about 70 to about 115.

PROCESSING ASPECTS

The principal solvents B. and some mixtures of principal solvents B. and secondary solvents, as disclosed hereinbefore, allow the preparation of premixes comprising the softener active A. (from about 55% to about 85%, preferably from about 60% to about 80%, more preferably from about 65% to about 75%, by weight of the premix); the principal solvent B. (from about 10% to about 30%, preferably from about 13% to about 25%, more preferably from about 15% to about 20%, by weight of the premix); and optionally, the water soluble solvent C (from about 5% to

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about 20%, preferably from about 5% to about 17%, more preferably from about 5% to about 15%, by weight of the premix). The principal solvents B. can optionally be replaced by a mixture of an effective amount of principal solvents B. and some inoperable solvents, as disclosed hereinbefore. These premixes contain the desired amount of fabric softening active A. and sufficient principal solvent B., and, optionally, solvent C., to give the premix the desired viscosity for the desired temperature range. Typical viscosities suitable for processing are less than about 1000 cps, preferably less than about 500 cps, more preferably less than about 300 cps. Use of low temperatures improves safety, by minimizing solvent vaporization, minimizes the degradation and/or loss of materials such as the biodegradable fabric softener active, perfumes, etc., and reduces the need for heating, thus saving on the expenses for processing. Additional protection for the softener active can be provided by adding, e.g., chelant such as ethylenediaminepentaacetic acid, during preparation of the active. The result is improved environmental impact and safety from the manufacturing operation.

Examples of premixes and processes using them include premixes which typically contain from about 55% to about 85%, preferably from about 60% to about 80%, more preferably from about 65% to about 75%, of fabric softener active A., as exemplified with DEQA¹ and DEQA⁸ in the Examples hereinafter, mixed with from about 10% to about 30%, preferably from about 13% to about 25%, more preferably from about 15% to about 20%, of principal solvent such as 1,2-hexanediol, and from about 5% to about 20%, preferably from about 5% to about 15%, of water soluble solvent C. like ethanol and/or isopropanol.

When the DEQA¹, containing about 13% ethanol, as disclosed hereinafter, is used as the fabric softening active, and 1,2-hexanediol is used as the principal solvent, the temperatures at which the premix is clear and/or liquid for various levels of principal solvent are as follows:

about 25% 1,2-hexanediol = clear below about -5°C, liquid below about -10°C.

about 17% 1,2-hexanediol = clear down to about 0°C, liquid down to about -10°C.

about 0% 1,2-hexanediol = clear down to about 17°C, liquid down to about 0°C.

These premixes can be used to formulate finished compositions in processes comprising the steps of:

1. Make premix of fabric softening active, e.g., about 72% DEQA¹, about 11% ethanol, and about 17% principal solvent, e.g., 1,2-hexanediol, let cool to ambient temperature.
2. Mix perfume in the premix.

3. Make up water seat of water and HCl at ambient temperature. Optionally add chelant.
4. Add premix to water under good agitation.
5. Trim with CaCl_2 solution to desired viscosity.
6. Add dye solution to get desired colour.

The fabric softening actives (DEQAs); the principal solvents B.; and, optionally, the water soluble solvents, can be formulated as premixes which can be used to prepare the following compositions.

EXAMPLE CXXXXI

<u>Component</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>	<u>Wt. %</u>
DEQA ¹ (100% active)	2	5	10.5	10.5	—
DEQA ⁸ (100% active)	—	—	—	—	10.5
Ethanol	0.35	0.88	1.85	1.85	—
Isopropanol	—	—	—	—	1.16
1,2-Hexanediol	0.48	1.2	2.53	2.53	2.39
Perfume	0.7	0.16	1.75	1.75	1.75
Chelant	—	—	—	250 ppm	250 ppm
HCl (100%)	0.02	0.02	0.02	0.02	0.02
CaCl_2	—	—	630 ppm	675 ppm	495 ppm
Dye	3 ppm	3 ppm	6 ppm	6 ppm	6 ppm
DI Water	Bal.	Bal.	Bal.	Bal.	Bal.

For commercial purposes, the above compositions are introduced into containers, specifically bottles, and more specifically clear bottles (although translucent bottles can be used), made from polypropylene (although glass, oriented polyethylene, etc., can be substituted), the bottle having a light blue tint to compensate for any yellow color that is present, or that may develop during storage (although, for short times, and perfectly clear products, clear containers with no tint, or other tints, can be used), and having an ultraviolet light absorber in the bottle to minimize the effects of ultraviolet light on the materials inside, especially the highly unsaturated actives (the absorbers can also be on the surface). The overall effect of the clarity and the container being to demonstrate the clarity of the compositions, thus assuring the consumer of the quality of the product.

WHAT IS CLAIMED IS:

1. Material capable of forming clear, concentrated, biodegradable, fabric softener compositions, said material being selected from the group consisting of:
 - A. compound selected from the group consisting of:
1,2-butanediol, 2,3,3-trimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 1,2-butanediol, 2,3,3-trimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 4-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 5-methyl-; 2,4-heptanediol, 5-methyl-; 2,5-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 2,6-octanediol; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-

hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; 2,5-hexanediol, 3,3,5-trimethyl-;

B. ether solvent selected from the group consisting of: 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyl-2-butyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-2-butyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; and 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated; bis(2-hydroxybutyl)ether; and bis(2-hydroxycyclopentyl)ether;

C. compounds which are homologs, or analogs, of the following compounds in which each homolog, or analog, contains at least one additional CH₂ group and the total number of hydrogen atoms is kept the same by inserting one double bond for each additional CH₂ group:

I. n-propanol;

II. 2-butanol and/or 2-methyl-2-propanol;

III. 2,3-butanediol, 2,3-dimethyl-; 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and/or 1,2-hexanediol;

IV. 1,3-propanediol, 2-butyl-; 1,3-propanediol, 2,2-diethyl-; 1,3-propanediol, 2-(1-methylpropyl)-; 1,3-propanediol, 2-(2-methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-

methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-; heptanediol; 1,5-heptanediol; and/or 1,6-heptanediol;

V. 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-

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dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

VI. 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VII. Alk xylated derivatives of C₃₋₈ di ls including:

1. 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol,

2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-

dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl-

(C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7)

PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpr pyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-

trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃;

7. mixtures thereof; and

VIII. aromatic diols including: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; and/or 1-phenyl-2,3-butanediol; and mixtures thereof; and

IX. mixtures thereof;

with the exception of the following specific compounds:

3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 6-Heptene-1,4-diol, 4-methyl-; 4-Octene-3,6-diol; 4-Octene-3,6-diol; 3-Octene-1,2-diol; 3-Nonene-2,5-diol; 7-Nonene-4,5-diol; 7-Nonene-4,5-diol; 6-Nonene-2,3-diol; 6-Heptene-2,4-diol, 5-methyl-; 6-Octene-1,2-diol, 7-methyl-3-methylene-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl-; 1,3-Propanediol, 2-(2-methylenepentyl)-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 5-Hexene-2,4-diol, 3,5-dimethyl-; 4-Hexene-1,2-diol, 2,5-dimethyl-; 4-Hexene-1,2-diol, 2,5-dimethyl-; 7-Octene-1,6-diol; 2-Hexene-1,4-diol, 2,5-dimethyl-; 2-Hexene-1,4-diol, 2,5-dimethyl-; 1,4-Hexanediol, 5-methyl-2-methylene-; 4-Octene-2,3-diol; Nonene-1,4-diol; 6-Heptene-1,4-diol, 4-methyl-; 6-Octene-3,5-diol, 4-methyl-; 2,6-Octadiene-1,8-diol, 2,6-dimethyl-; (8-Hydroxygeraniol); 1-Heptene-3,5-diol, 2,4-dimethyl-; 2,4-Hexanediol, 5-methyl-3-methylene-; 2,4-Hexanediol, 5-methyl-3-methylene-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 6-Heptene-2,4-diol, 5-methyl-; 4,9-Decadiene-1,8-diol; 5-Hexene-1,3-diol, 2,4-dimethyl-; 7-Octene-1,3-diol, 2-methyl-; 5-Heptene-3-d-1,2-diol, 2,6-dimethyl-; 5-Heptene-3-d-1,2-diol, 2,6-dimethyl-; 4-Nonene-2,8-diol; 4-Nonene-2,8-diol; 5-Hexene-2,3-diol, 2,3-dimethyl-; 2-Butene-1,4-diol, 2-butyl-; 2,4-Hexadiene-1,6-diol, 3-(1,1-dimethylethyl)-; 6-Octene-1,4-diol, 7-methyl-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-2,5-diol, 7-methyl-; 4-Hexene-1,3-diol, 2,4-dimethyl-; 4-Octene-2,7-diol; 4-Octene-2,7-diol; 3-Heptene-1,2-diol, 5-methyl-; 3-Heptene-1,2-diol, 5-methyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 8-Nonene-1,7-diol; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Isorosiridol); 5-Hexene-1,4-diol, 2,4-dimethyl-; 1-Heptene-3,4-diol, 6-methyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3,9-Decadiene-1,2-diol; 7-Octene-2,3-diol, 2-methyl-; 7-Octene-2,3-diol, 2-methyl-; 6-Nonene-2,3-diol; 2,5-Hexanediol, 3-methyl-4-methylene-; 6-Heptene-1,4-diol, 2-methyl-; 6-Octene-1,5-diol; 1-Octene-3,4-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-1,6-diol, 5-methyl-; 1,3-Butanediol, 2-methyl-2-(1-methylethenyl)-; 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,5-Octanediol, 4-methylene-; 6-Heptene-2,3-diol, 2-methyl-; 6-Heptene-2,3-diol, 2,6-dimethyl-; 6-Heptene-2,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 1-Nonene-3,4-diol; 5-Heptene-1,2-diol, 3-methyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 4-Nonene-1,3-diol; 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-; 1-Nonene-3,4-diol; 8-Nonene-1,2-diol; 3-Octene-1,2-diol; 1,9-Decadiene-4,6-diol; 1,9-

Decadiene-4,6-diol; 5-Hexene-1,3-diol, 2,2-dimethyl-; 1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 8-Nonene-1,3-diol; 2,4-Octadiene-1,8-diol, 2,7-dimethyl-; 5-Heptene-1,2-diol, 6-methyl-; 3,9-Decadiene-1,2-diol; 3-Nonene-1,2-diol; 6-Nonene-1,2-diol; 4-Hexene-1,3-diol, 2,4-dimethyl-; 2,4-Octadiene-1,7-diol, 3,7-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 1,3-Butanediol, 2-methyl-2-(2-propenyl)-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 6-Heptene-1,5-diol, 6-methyl-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 1,5-Pentanediol, 2-(2-propenyl)-; 5-Hexene-2,3-diol, 3,5-dimethyl-; 5-Hexene-2,3-diol, 3,5-dimethyl-; Nonenediol; Octenediol; 5-Hexene-1,3-diol, 3,5-dimethyl-; 4-Nonene-1,8-diol; 4-Nonene-1,7-diol; 4-Nonene-1,6-diol; 6-Nonene-1,4-diol; 2-Nonene-1,4-diol; 8-Nonene-2,5-diol; 5-Heptene-1,2-diol, 2-ethenyl-6-methyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 5-Heptene-2,3-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 7-Octene-1,3-diol, 7-methyl-; 1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 5,7-Octadiene-2,3-diol, 2,6-dimethyl-; 5,7-Octadiene-2,3-diol, 2,6-dimethyl-; 5-Hexene-1,2-diol, 2-ethyl-; 2,4-Nonadiene-4-d-1,7-diol, 6-methyl-; 2,4-Nonadiene-1,6,7-d3-1,7-diol, 6-methyl-; 2,4-Nonadiene-1,7-diol, 6-methyl-; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 1,3-Butanediol, 3-methyl-2-(4-pentenylidene)-; 1,3-Butanediol, 3-methyl-2-(4-pentenylidene)-; 2-Hexene-1,4-diol, 5,5-dimethyl-; 2-Hexene-1,4-diol, 5,5-dimethyl-; 2-Nonene-1,4-diol; 2-Nonene-1,4-diol; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 5-Octene-1,3-diol; 7-Octene-1,3-diol, 2-methyl-; 4-Heptene-1,3-diol, 2-methyl-; 4-Octene-2,3-d2-1,2-diol; 4-Octene-2,3-d2-1,2-diol; 5-Heptene-1,2-diol, 3-methyl-; 5-Octene-1,2-diol; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 1,7-Octadiene-4,5-diol, 4,5-dimethyl-; 1,7-Octadiene-4,5-diol, 4,5-dimethyl-; 5-Heptene-1,3-diol, 2-methyl-; 5-Heptene-1,3-diol, 2-methyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1,8-diol, 2,6-dimethyl-; 2-Heptene-1,5-diol, 6-methyl-; 2-Heptene-1,5-diol, 6-methyl-; 8,9-Decadiene-3,5-diol; 8,9-Decadiene-3,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 3,5-Nonadiene-1,7-diol, 8-methyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 2-Nonene-1,9-diol; 2-Nonene-1,9-diol; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 3-Heptene-1,5-diol, 6-methyl-; 1,3-Pentanediol, 2-ethenyl-4-methyl-; 1,3-Pentanediol, 2-ethenyl-4-methyl-; 5-Hexene-

2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 2,3,4-trimethyl-; 4-Pentene-1,2-diol, 2,3,3-trimethyl-; 1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-(2-butenyl)-2-(2-propenyl)-; 5-Hexene-1,2-diol, 2-ethyl-; 1,4-Butanediol, 2-(4-methyl-3-pentenylidene)- (β -Acaridiol); 6-Heptene-1,3-diol, 2-methyl-; 2,6-Octadiene-1,8-diol-2-13C, 2,6-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Nonene-3,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,4-diol; 7-Octene-1,2-diol, 2-methyl-; 1-Nonene-3,5-diol; 2,7-Octadiene-1,6-diol, 2,6-dimethyl-; 7-Octene-1,2-diol; 7-Octene-1,2-diol; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 1,3-Propanediol, 2-(2,2-dimethylpropylidene)-; 6-Octene-1,2-diol, 7-methyl-3-methylene-; 2,8-Decadiene-1,10-diol; 6-Octene-1,5-diol, 7-methyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 4-Hexene-1,2-diol, 4-ethyl-3-methyl-; 8-Nonene-1,3-diol; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 8-Nonene-2,4-diol; 2,6-Heptanediol, 4-methylene-; 3-Hexene-3,4-diol, 2,5-dimethyl-; 4-Octene-4,5-diol; 5-Hexene-1,2-diol, 2,3-dimethyl-; 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-; 3-Hexene-1,5-diol, 2,4-dimethyl-; 3-Hexene-1,5-diol, 2,4-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3,6-Octadiene-1,2-diol, 3,7-dimethyl-; 7-Octene-2,3-diol, 6-methyl-; 7-Octene-2,3-diol, 6-methyl-; 7-Octene-2,3-diol, 6-methyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 6-Octene-1,3-diol, 7-methyl-; Decadienediol; 6-Heptene-1,2-diol, 2,3-dimethyl-; 4-Hexene-1,3-diol, 3,5-dimethyl-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 1,3-Hexanediol, 5-methyl-4-methylene-; 4-Octene-1,2-diol; 2,3-Heptanediol, 3-ethenyl-; 2,3-Heptanediol, 3-ethenyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 3,7-dimethyl-; 8-Nonene-2,4-diol; 8-Nonene-2,4-diol; 1,3-Octanediol, 2-methylene-; 8-Nonene-1,3-diol; 5-Heptene-1,4-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 4-Octene-2,3-diol; 4-Octene-2,3-diol; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 7-Octene-1,3-diol, 7-methyl-; 2-Heptene-1,5-diol, 5-ethyl-; 2-Heptene-1,5-diol, 5-ethyl-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 8-Nonene-3,4-diol; 8-Nonene-3,4-diol; 5-Hexene-1,3-diol, 4,5-dimethyl-; 5-Hexene-1,3-diol, 4,5-dimethyl-; 4,6-Octadiene-2,3-diol, 3,7-dimethyl-; 1,3-Butanediol, 2,2-diallyl-; 1,9-Decadiene-3,8-diol; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,4-diol, 5-methyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,4-di l, 5-methyl-; 2,8-Decadiene-5,6-diol; 2,7-Octadiene-1,6-di l, 2,6-dimethyl- (8-Hydroxylinool); 6-Heptene-1,2-diol, 2-methyl-; 5-Hexene-1,3-diol, 2,3-dimethyl-; 2,6-Octadiene-1,8-diol, 6-methyl-2-(methyl-

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13C)-; 1,3-Propanediol, 2-(5-hexenyl)-; 8-Nonene-3,4-diol; 5-Hexene-1,3-diol, 3-ethyl-; 7-Octene-3,4-diol; 6-Heptene-1,2-diol, 2-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 8-Nonene-3,4-diol; 6-Heptene-2,3-diol, 6-methyl-; 6-Heptene-2,3-diol, 2,6-dimethyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 4,6-Octadiene-2,3-diol, 2,6-dimethyl-; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 7-Octene-2,3-diol, 6-methyl-; 4,6-Octadiene-2,3-diol, 2,6-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 2-Butene-1,4-diol, 2-(4-methyl-3-pentenyl)- (α -Acaridol); 4-Octene-1,2-diol; 4-Octene-1,2-diol; 7-Octene-2,4-diol; 6-Heptene-2,4-diol, 3-methyl-; 6-Heptene-2,4-diol, 3-methyl-; 3-Heptene-2,5-diol, 2,4-dimethyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 7-Octene-3,5-diol, 2-methyl-; 7-Octene-3,5-diol, 2-methyl-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 1,3-Propanediol, 2-methyl-2-(2-methylallyl)-; 2-Heptene-1,6-diol, 6-methyl-; 1,3-Butanediol, 2-allyl-3-methyl-; 2-Nonene-1,4-diol; 5-Hexene-2,3-diol, 4-ethenyl-2,5-dimethyl-; 5-Hexene-2,3-diol, 4-ethenyl-2,5-dimethyl- 2-Nonene-1,4-diol; 5-Heptene-1,3-diol, 3,6-dimethyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; and 1,3-Propanediol, 2-(1-pentenyl)-; and

D. mixtures of the above compounds; and

E. mixtures of 8-carbon-diol isomers primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2-dimethyl-2,4-hexanediol; 2-methyl-3,5-heptanediol; and/or 3-methyl-3,5-heptanediol, the level of any individual 1,3-diol being less than about 90% of any mixture.

2. The material of Claim 1 that is a compound selected from the group consisting of:

1,2-butanediol, 2,3,3-trimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-

methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 4-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 5-methyl-; 2,4-heptanediol, 5-methyl-; 2,5-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 2,6-octanediol, 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; 2,5-hexanediol, 3,3,5-trimethyl-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyl xy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; and 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated.

3. The material of Claim 1 that is an ether solvent selected from the group consisting of: 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyl-1-butyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-1-butyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; and 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated; bis(2-hydroxybutyl)ether; and bis(2-hydroxycyclopentyl)ether.

4. The material of Claim 1 that is a compound which is a homolog, or analog, of the following compounds in which each homolog, or analog, contains at least one additional CH_2 group and the total number of hydrogen atoms is kept the same by inserting one double bond for each additional CH_2 group:

- I. n-propanol;
- II. 2-butanol and/or 2-methyl-2-propanol;
- III. 2,3-butanediol, 2,3-dimethyl-; 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol, 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and/or 1,2-hexanediol;
- IV. 1,3-propanediol, 2-butyl-; 1,3-propanediol, 2,2-diethyl-; 1,3-propanediol, 2-(1-methylpropyl)-; 1,3-propanediol, 2-(2-methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 1,2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-

methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-; heptanediol; 1,5-heptanediol; and 1,6-heptanediol;

V. 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-

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dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

VI. 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 1,3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VIII. Alkoxylated derivatives of C₃₋₈ diols including:

1. 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol,

2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-

dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 1, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 1, 2-methyl- (C6) PO₁; 2,3-pentanediol, 1, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl-

(C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7)

PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-

trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and IX. mixtures thereof;

with the exception of the following specific compounds:

3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 4,6-Octadiene-1,2-diol, 3,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 6-Heptene-1,4-diol, 4-methyl-; 4-Octene-3,6-diol; 4-Octene-3,6-diol; 3-Octene-1,2-diol; 3-Nonene-2,5-diol; 7-Nonene-4,5-diol; 7-Nonene-4,5-diol; 6-Nonene-2,3-diol; 6-Heptene-2,4-diol, 5-methyl-; 6-Octene-1,2-diol, 7-methyl-3-methylene-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl-; 1,3-Propanediol, 2-(2-methylenepentyl)-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 3-Heptene-2,6-diol, 2,6-

dimethyl-; 5-Hexene-2,4-diol, 3,5-dimethyl-; 4-Hexene-1,2-diol, 2,5-dimethyl-; 4-Hexene-1,2-diol, 2,5-dimethyl-; 7-Octene-1,6-diol; 2-Hexene-1,4-diol, 2,5-dimethyl-; 2-Hexene-1,4-diol, 2,5-dimethyl-; 1,4-Hexanediol, 5-methyl-2-methylene-; 4-Octene-2,3-diol; Nonene-1,4-diol; 6-Heptene-1,4-diol, 4-methyl-; 6-Octene-3,5-diol, 4-methyl-; 2,6-Octadiene-1,8-diol, 2,6-dimethyl-; (8-Hydroxygeraniol); 1-Heptene-3,5-diol, 2,4-dimethyl-; 2,4-Hexanediol, 5-methyl-3-methylene-; 2,4-Hexanediol, 5-methyl-3-methylene-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 6-Heptene-2,4-diol, 5-methyl-; 4,9-Decadiene-1,8-diol; 5-Hexene-1,3-diol, 2,4-dimethyl-; 7-Octene-1,3-diol, 2-methyl-; 5-Heptene-3-d-1,2-diol, 2,6-dimethyl-; 5-Heptene-3-d-1,2-diol, 2,6-dimethyl-; 4-Nonene-2,8-diol; 4-Nonene-2,8-diol; 5-Hexene-2,3-diol, 2,3-dimethyl-; 2-Butene-1,4-diol, 2-butyl-; 2,4-Hexadiene-1,6-diol, 3-(1,1-dimethylethyl)-; 6-Octene-1,4-diol, 7-methyl-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-2,5-diol, 7-methyl-; 4-Hexene-1,3-diol, 2,4-dimethyl-; 4-Octene-2,7-diol; 4-Octene-2,7-diol; 3-Heptene-1,2-diol, 5-methyl-; 3-Heptene-1,2-diol, 5-methyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 8-Nonene-1,7-diol, 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Isorosiridol); 5-Hexene-1,4-diol, 2,4-dimethyl-; 1-Heptene-3,4-diol, 6-methyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3,9-Decadiene-1,2-diol; 7-Octene-2,3-diol, 2-methyl-; 7-Octene-2,3-diol, 2-methyl-; 6-Nonene-2,3-diol; 2,5-Hexanediol, 3-methyl-4-methylene-; 6-Heptene-1,4-diol, 2-methyl-; 6-Octene-1,5-diol; 1-Octene-3,4-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-1,6-diol, 5-methyl-; 1,3-Butanediol, 2-methyl-2-(1-methylethenyl)-; 1,3-Pentenediol, 2-ethenyl-4,4-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,5-Octanediol, 4-methylene-; 6-Heptene-2,3-diol, 2-methyl-; 6-Heptene-2,3-diol, 2,6-dimethyl-; 6-Heptene-2,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 1-Nonene-3,4-diol; 5-Heptene-1,2-diol, 3-methyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 4-Nonene-1,3-diol; 1,4-Pentenediol, 3-methyl-2-(2-propenyl)-; 1-Nonene-3,4-diol; 8-Nonene-1,2-diol; 3-Octene-1,2-diol; 1,9-Decadiene-4,6-diol; 1,9-Decadiene-4,6-diol; 5-Hexene-1,3-diol, 2,2-dimethyl-; 1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 8-Nonene-1,3-diol; 2,4-Octadiene-1,8-diol, 2,7-dimethyl-; 5-Heptene-1,2-diol, 6-methyl-; 3,9-Decadiene-1,2-diol; 3-Nonene-1,2-diol; 6-Nonene-1,2-diol; 4-Hexene-1,3-diol, 2,4-dimethyl-; 2,4-Octadiene-1,7-diol, 3,7-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 1,3-Butanediol, 2-

methyl-2-(2-propenyl)-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 6-Heptene-1,5-diol, 6-methyl-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 1,5-Pentanediol, 2-(2-propenyl)-; 5-Hexene-2,3-diol, 3,5-dimethyl-; 5-Hexene-2,3-diol, 3,5-dimethyl-; Nonenediol; Octenediol; 5-Hexene-1,3-diol, 3,5-dimethyl-; 4-Nonene-1,8-diol; 4-Nonene-1,7-diol; 4-Nonene-1,6-diol; 6-Nonene-1,4-diol; 2-Nonene-1,4-diol; 8-Nonene-2,5-diol; 5-Heptene-1,2-diol, 2-ethenyl-6-methyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 5-Heptene-2,3-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 7-Octene-1,3-diol, 7-methyl-; 1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 5,7-Octadiene-2,3-diol, 2,6-dimethyl-; 5,7-Octadiene-2,3-diol, 2,6-dimethyl-; 5-Hexene-1,2-diol, 2-ethyl-; 2,4-Nonadiene-4-d-1,7-diol, 6-methyl-; 2,4-Nonadiene-1,6,7-d-3-1,7-diol, 6-methyl-; 2,4-Nonadiene-1,7-diol, 6-methyl-; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 1,3-Butanediol, 3-methyl-2-(4-pentenylidene)-; 1,3-Butanediol, 3-methyl-2-(4-pentenylidene)-; 2-Hexene-1,4-diol, 5,5-dimethyl-; 2-Hexene-1,4-diol, 5,5-dimethyl-; 2-Nonene-1,4-diol; 2-Nonene-1,4-diol; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 5-Octene-1,3-diol; 7-Octene-1,3-diol, 2-methyl-; 4-Heptene-1,3-diol, 2-methyl-; 4-Octene-2,3-d-1,2-diol; 4-Octene-2,3-d-1,2-diol; 5-Heptene-1,2-diol, 3-methyl-; 5-Octene-1,2-diol; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 5-Heptene-1,2-diol, 2,6-dimethyl-; 1,7-Octadiene-4,5-diol, 4,5-dimethyl-; 1,7-Octadiene-4,5-diol, 4,5-dimethyl-; 5-Heptene-1,3-diol, 2-methyl-; 5-Heptene-1,3-diol, 2-methyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1-t-1,8-diol, 2,6-dimethyl-; 2,6-Octadiene-1-d-1,8-diol, 2,6-dimethyl-; 2-Heptene-1,5-diol, 6-methyl-; 8,9-Decadiene-3,5-diol; 8,9-Decadiene-3,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 3,5-Nonadiene-1,7-diol, 8-methyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 2-Nonene-1,9-diol; 2-Nonene-1,9-diol; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 3-Heptene-1,5-diol, 6-methyl-; 1,3-Pentanediol, 2-ethenyl-4-methyl-; 1,3-Pentanediol, 2-ethenyl-4-methyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 2,3,4-trimethyl-; 4-Pentene-1,2-diol, 2,3,3-trimethyl-; 1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-(2-butenyl)-2-(2-propenyl)-; 5-Hexene-1,2-diol, 2-ethyl-; 1,4-Butanediol, 2-(4-methyl-3-pentenylidene)- (β -Acaridiol); 6-Heptene-1,3-diol, 2-methyl-; 2,6-Octadiene-1,8-diol-2-13C, 2,6-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Nonene-3,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,4-diol; 7-Octene-1,2-diol, 2-methyl-; 1-Nonene-3,5-di 1; 2,7-Octadiene-1,6-diol, 2,6-dimethyl-; 7-Octene-1,2-diol; 7-Octene-1,2-diol; 2,5-Octadiene-1,7-

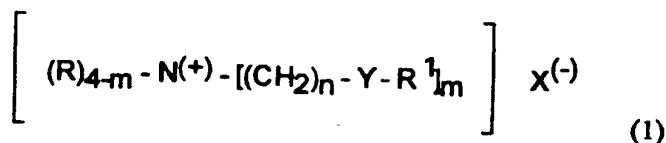
diol, 3,7-dimethyl-; 1,3-Propanediol, 2-(2,2-dimethylpropylidene)-; 6-Octene-1,2-diol, 7-methyl-3-methylene-; 2,8-Decadiene-1,10-diol; 6-Octene-1,5-diol, 7-methyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 4-Hexene-1,2-diol, 4-ethyl-3-methyl-; 8-Nonene-1,3-diol; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 8-Nonene-2,4-diol; 2,6-Heptanediol, 4-methylene-; 3-Hexene-3,4-diol, 2,5-dimethyl-; 4-Octene-4,5-diol; 5-Hexene-1,2-diol, 2,3-dimethyl-; 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-; 3-Hexene-1,5-diol, 2,4-dimethyl-; 3-Hexene-1,5-diol, 2,4-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3,6-Octadiene-1,2-diol, 3,7-dimethyl-; 7-Octene-2,3-diol, 6-methyl-; 7-Octene-2,3-diol, 6-methyl-; 7-Octene-2,3-diol, 6-methyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 6-Octene-1,3-diol, 7-methyl-; Decadienediol; 6-Heptene-1,2-diol, 2,3-dimethyl-; 4-Hexene-1,3-diol, 3,5-dimethyl-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 1,3-Hexanediol, 5-methyl-4-methylene-; 4-Octene-1,2-diol; 2,3-Heptanediol, 3-ethenyl-; 2,3-Heptanediol, 3-ethenyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 5-Hexene-1,3-diol, 2,4-dimethyl-; 2,6-Octadiene-1-t-1,8-diol, 3,7-dimethyl-; 8-Nonene-2,4-diol; 8-Nonene-2,4-diol; 1,3-Octanediol, 2-methylene-; 8-Nonene-1,3-diol; 5-Heptene-1,4-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 4-Octene-2,3-diol; 4-Octene-2,3-diol; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 7-Octene-1,3-diol, 7-methyl-; 2-Heptene-1,5-diol, 5-ethyl-; 2-Heptene-1,5-diol, 5-ethyl-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 8-Nonene-3,4-diol; 8-Nonene-3,4-diol; 5-Hexene-1,3-diol, 4,5-dimethyl-; 5-Hexene-1,3-diol, 4,5-dimethyl-; 4,6-Octadiene-2,3-diol, 3,7-dimethyl-; 1,3-Butanediol, 2,2-diallyl-; 1,9-Decadiene-3,8-diol; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,4-diol, 5-methyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,4-diol, 5-methyl-; 2,8-Decadiene-5,6-diol; 2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool); 6-Heptene-1,2-diol, 2-methyl-; 5-Hexene-1,3-diol, 2,3-dimethyl-; 2,6-Octadiene-1,8-diol, 6-methyl-2-(methyl-13C)-; 1,3-Propanediol, 2-(5-hexenyl)-; 8-Nonene-3,4-diol; 5-Hexene-1,3-diol, 3-ethyl-; 7-Octene-3,4-diol; 6-Heptene-1,2-diol, 2-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 8-Nonene-3,4-diol; 6-Heptene-2,3-diol, 6-methyl-; 6-Heptene-2,3-diol, 2,6-dimethyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 4,6-Octadiene-2,3-diol, 2,6-dimethyl-; 7-Octene-2,3-diol, 2-methyl-6-methylene-; 7-Octene-2,3-diol, 6-methyl-; 4,6-Octadiene-2,3-diol, 2,6-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 2-Butene-1,4-diol, 2-(4-methyl-3-pentenyl)- (α -Acaridiol); 4-Octene-1,2-diol; 4-Octene-1,2-diol; 7-Octene-2,4-diol; 6-Heptene-2,4-

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diol, 3-methyl-; 6-Heptene-2,4-diol, 3-methyl-; 3-Heptene-2,5-diol, 2,4-dimethyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 7-Octene-3,5-diol, 2-methyl-; 7-Octene-3,5-diol, 2-methyl-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 1,3-Propanediol, 2-methyl-2-(2-methylallyl)-; 2-Heptene-1,6-diol, 6-methyl-; 1,3-Butanediol, 2-allyl-3-methyl-; 2-Nonene-1,4-diol; 5-Hexene-2,3-diol, 4-ethenyl-2,5-dimethyl-; 5-Hexene-2,3-diol, 4-ethenyl-2,5-dimethyl- 2-Nonene-1,4-diol; 5-Heptene-1,3-diol, 3,6-dimethyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; and 1,3-Propanediol, 2-(1-pentenyl)-.

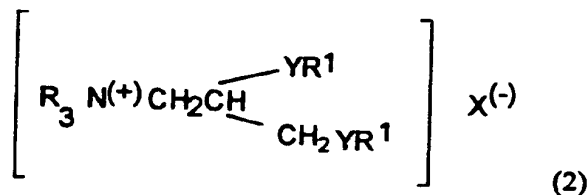
5. The material of Claim 1 that is a mixture of the compounds A., B., and/or C.
6. The material of Claim 1 which is a mixture of 8-carbon-diol isomers primarily consisting of: 2,2,4-trimethyl-1,3-pentanediol; 2-ethyl-1,3-hexanediol; 2,2-dimethyl-1,3-hexanediol; 2-ethyl-4-methyl-1,3-pentanediol; 2-ethyl-3-methyl-1,3-pentanediol; 3,5-octanediol; 2,2-dimethyl-2,4-hexanediol; 2-methyl-3,5-heptanediol; and/or 3-methyl-3,5-heptanediol, the level of any individual diol isomer being less than about 90% of any mixture.
7. The material of Claim 6 wherein the level of any individual diol isomer is less than about 80% of any mixture.
8. The material of Claim 6 wherein the level of any individual diol isomer is less than about 70% of any mixture.
9. The material of Claim 6 wherein the level of any individual diol isomer is less than about 60% of any mixture.
10. The material of Claim 6 wherein the level of any individual diol isomer is less than about 50% of any mixture.
11. An aqueous, stable, fabric softener composition comprising:
 - A. from about 2% to about 80% of fabric softener active selected from the group consisting of:
 1. fabric softener compound having the formula:

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wherein each R substituent is H, or a short chain C₁-C₆ alkyl or hydroxyalkyl group, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, but not -OC(O)O-; the sum of carbons in each R¹, or YR¹ when Y is -O-(O)C- or -(R)N-(O)C-, being C₆-C₂₂, but when the sum of carbons in one R¹, or YR¹, is less than about 12, then the other R¹, or YR¹, sum is at least about 16, with each R¹ being a long chain hydrocarbyl, or substituted hydrocarbyl substituent group, and for R¹, or YR¹, C₁₆-C₂₀ hydrocarbyl or substituted hydrocarbyl substituent groups, the Iodine Value of a YR¹ fatty acid which contains this R¹ group is from about 20 to about 140, and for R¹, or YR¹, C₈-C₁₄, hydrocarbyl, or substituted hydrocarbyl substituent groups, the Iodine Value of a fatty acid which contains this R¹ group is about 10 or less;

2. fabric softener compound having the formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before; and

3. mixtures thereof;

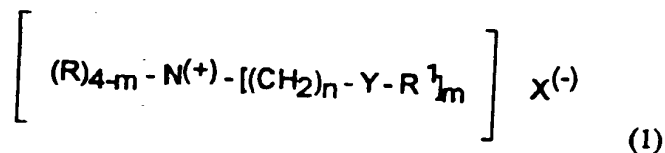
B. less than about 40% by weight of the composition of principal solvent having a ClogP of from about 0.15 to about 0.64, and at least some degree of asymmetry, said principal solvent containing insufficient amounts of solvents selected from the group consisting of: 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethylhexyl-1,3-diol, to provide an aqueous stable composition by themselves;

C. optionally, an effective amount, sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, and propylene carbonate, said

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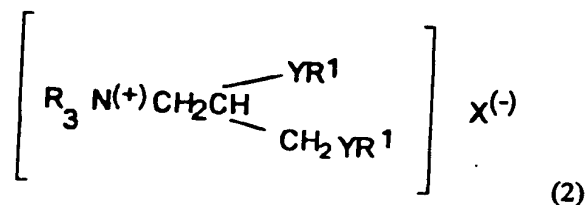
- water soluble solvents being at a level that will not form clear compositions by themselves;
- D. optionally, an effective amount to improve clarity, of water soluble calcium and/or magnesium salt; and
- E. the balance being water.

12. The aqueous, stable, fabric softener composition of Claim 11 comprising:
- A. from about 13% to about 75% of said fabric softener active selected from the group consisting of:
1. fabric softener compound having the formula:



wherein each R substituent is H, or a short chain C₁-C₃ alkyl or hydroxyalkyl group, benzyl or mixtures thereof; each m is 2; each n is from 2 to about 3; each Y is -O-(O)C-; each R¹ is a long chain C₉-C₁₉ hydrocarbyl, and for R¹ C₁₅-C₁₉ hydrocarbyl or substituted hydrocarbyl substituent groups, the Iodine Value of the corresponding fatty acid of this R¹ group is from about 50 to about 130; and for R¹ C₇-C₁₃, or substituted hydrocarbyl substituent groups, the Iodine Value of the corresponding fatty acid of R¹ group is about 10 or less;

2. fabric softener compound having the formula:

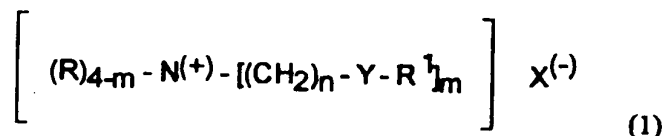


wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before; and

3. mixtures thereof;
- B. from about 10% to about 35% by weight of the composition of said principal solvent, said principal solvent having a Cl gP f from about 0.25 to about 0.62;

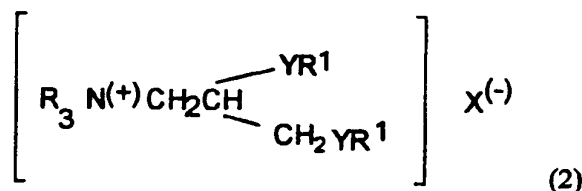
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- C. optionally, from about 1% to about 10%, and sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate, said water soluble solvents being at a level that will not form clear compositions by themselves;
- D. optionally, from 0% to about 2%, and sufficient to improve clarity, achieve the desired viscosity, or improve clarity and achieve the desired viscosity, of water soluble calcium and/or magnesium salt; and
- E. from about 10% to about 80% water.
13. The aqueous, stable, fabric softener composition of Claim 12 comprising:
- A. from about 17% to about 70% of said fabric softener active selected from the group consisting of:
1. fabric softener compound having the formula:



wherein each R substituent is H, or a short chain C₁-C₃ alkyl or hydroxyalkyl group, benzyl or mixtures thereof; each m is 2; each n is from 2 to about 3; each Y is -O-(O)C-; each R¹ is a long chain C₇-C₁₇ hydrocarbyl, or substituted hydrocarbyl substituent, and for R¹ C₁₅-C₁₇ hydrocarbyl or substituted hydrocarbyl substituent groups, the Iodine Value of the corresponding fatty acid of this R¹ group is from about 70 to about 115; and for R¹ C₇-C₁₃, or substituted hydrocarbyl substituent groups, the Iodine Value of the corresponding fatty acid of R¹ group is about 5 or less;

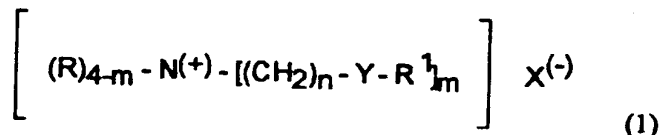
2. fabric softener compound having the formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before; and

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3. mixtures thereof,
 - B. from about 12% to about 35% by weight of the composition of said principal solvent, said principal solvent having a ClogP of from about 0.40 to about 0.60;
 - C. optionally, from about 2% to 8%, and sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate;
 - D. optionally, from about 0.05% to about 0.5%, and sufficient to improve clarity, achieve the desired viscosity, or improve clarity and achieve the desired viscosity, of water soluble calcium and/or magnesium salt; and
 - E. from about 20% to about 80% water.
14. The aqueous, stable, fabric softener composition of Claim 13, said composition being clear and comprising:
- A. from about 19% to about 65% by weight of the composition, of said fabric softener:
 1. fabric softener compound having the formula:



wherein each R substituent is methyl, ethyl, propyl, hydroxyethyl, benzyl or mixtures thereof; each n is 2; each R¹ is a long chain C₁₃-C₁₇ straight chain alkyl or alkylene, and for R¹ C₁₅-C₁₇ hydrocarbyl or substituted hydrocarbyl substituent groups, the Iodine Value of the corresponding fatty acid of this R¹ group is from about 70 to about 115;

- B. from about 14% to about 35% by weight of the composition of said principal solvent, said principal solvent having a ClogP of from about 0.40 to about 0.60;
- C. optionally, from about 2% to 8%, and sufficient to improve clarity, of low molecular weight water soluble solvents selected from the group consisting of: ethanol, isopropanol, propylene glycol, 1,3-propanediol, and propylene carbonate;

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- D. optionally, from about 0.1% to about 0.25%, and sufficient to improve clarity, achieve the desired viscosity, or improve clarity and achieve the desired viscosity, of water soluble calcium or magnesium chloride, acetate, or nitrate; and
 - E. from about 30% to about 70% water.
15. The composition of Claim 11 wherein said ClogP is from about 0.25 to about 0.62.
16. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of:
n-propanol; 2-butanol; 2-methyl-2-propanol; and mixtures thereof.
17. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 2,3-butanediol, 2,3-dimethyl-, 1,2-butanediol, 2,3-dimethyl-, 1,2-butanediol, 3,3-dimethyl-, 2,3-pentanediol, 2-methyl-, 2,3-pentanediol, 3-methyl-, 2,3-pentanediol, 4-methyl-, 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-, 1,2-pentanediol, 2-methyl-, 1,2-pentanediol, 3-methyl-, 1,2-pentanediol, 4-methyl-, 1,2-hexanediol; and mixtures thereof.
18. The composition of Claim 17 wherein said principal solvent is selected from the group consisting of:
1,2-butanediol, 2,3-dimethyl-, 1,2-butanediol, 3,3-dimethyl-, 2,3-pentanediol, 2-methyl-, 2,3-pentanediol, 3-methyl-, 2,3-pentanediol, 4-methyl-, 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-, 1,2-pentanediol, 2-methyl-, 1,2-pentanediol, 3-methyl-, 1,2-pentanediol, 4-methyl-, 1,2-hexanediol; and mixtures thereof.
19. The composition of Claim 18 wherein said principal solvent is selected from the group consisting of:
1,2-butanediol, 2-ethyl-, 1,2-pentanediol, 2-methyl-, 1,2-pentanediol, 3-methyl-, 1,2-pentanediol, 4-methyl-, and 1,2-hexanediol; and mixtures thereof.
20. The composition of Claim 19 wherein said principal solvent is 1,2-hexanediol.
21. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 1,3-propanediol, 2-butyl-, 1,3-propanediol, 2,2-diethyl-, 1,3-propanediol, 2-(1-methylpropyl)-, 1,3-propanediol, 2-(2-

methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; 1,6-heptanediol ; and mixtures thereof.

22. The composition of Claim 21 wherein said principal solvent is selected from the group consisting of:

1,3-propanediol, 2-butyl-; 1,4-butanediol, 2-propyl-; 1,5-pentanediol, 2-ethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; 1,6-heptanediol; and mixtures thereof.

23. The composition of Claim 22 wherein said principal solvent is selected from the group consisting of:

2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; and mixtures thereof.

24. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-

isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-

hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; 3,6-octanediol; and mixtures thereof.

25. The composition of Claim 24 wherein said principal solvent is selected from the group consisting of: 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-

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pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; 3,6-octanediol; and mixtures thereof.

26. The composition of Claim 25 wherein said principal solvent is selected from the group consisting of:

1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-

propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-

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heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol; and mixtures thereof.

27. The composition of Claim 26 wherein said principal solvent is selected from the group consisting of: 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; 2,5-hexanediol, 3,3,5-trimethyl-; and mixtures thereof.

28. The composition of Claim 27 wherein said principal solvent is 2,4-pentanediol, 2,3,3,4-tetramethyl-.

29. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyl-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-; 1,3-propanediol, 2-phenyloxy-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; 1,3-propanediol, 2-(1-phenylethyloxy)-; bis(2-hydroxybutyl)ether; bis(2-hydroxycyclopentyl)ether; and mixtures thereof.

30. The composition of Claim 29 wherein said principal solvent is selected from the group consisting of:

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1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amtyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amtyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; bis(2-hydroxybutyl)ether, bis(2-hydroxycyclopentyl)ether, and mixtures thereof.

31. The composition of Claim 30 wherein said principal solvent is selected from the group consisting of:

1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amtyloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amtyloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, 2-(2-phenylethyloxy)-; bis(2-hydroxybutyl)ether, bis(2-hydroxycyclopentyl)ether, and mixtures thereof.

32. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-

cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 2-hydroxymethylcyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxylate; 1,2-cyclohexanediol, dibutylenoxylate; 1,2-cyclohexanediol, tributylenoxylate; 1,2-cyclobutanediol, 1-ethenyl-2-ethyl-; 3-cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-; 3-cyclobutene-1,2-diol, 3,4-diethyl-; 3-cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-; 3-cyclobutene-1,2-diol, 3-butyl-; 1,2-cyclopentanediol, 1,2-dimethyl-4-methylene-; 1,2-cyclopentanediol, 1-ethyl-3-methylene-; 1,2-cyclopentanediol, 4-(1-propenyl)-; 3-cyclopentene-1,2-diol, 1-ethyl-3-methyl-; 1,2-cyclohexanediol, 1-ethenyl-; 1,2-cyclohexanediol, 1-methyl-3-methylene-; 1,2-cyclohexanediol, 1-methyl-4-methylene-; 1,2-cyclohexanediol, 3-ethenyl-; 1,2-cyclohexanediol, 4-ethenyl-; 3-cyclohexene-1,2-diol, 2,6-dimethyl-; 3-cyclohexene-1,2-diol, 6,6-dimethyl-; 4-cyclohexene-1,2-diol, 3,6-dimethyl-; 4-

cyclohexene-1,2-diol, 4,5-dimethyl-, 3-cyclooctene-1,2-diol; 4-cyclooctene-1,2-diol; 5-cyclooctene-1,2-diol; and mixtures thereof.

33. The composition of Claim 32 wherein said principal solvent is selected from the group consisting of:

1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1-hydroxy-cyclohexanemethanol; 1-methyl-1,2-cyclohexanediol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-cyclohexanediol; 1,2-cycloheptanediol; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, dibutylenoxylate; and mixtures thereof.

34. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of:

1. 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-

propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-

butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (M-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7)

PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7)

E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-

BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-

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butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof.

35. The composition of Claim 34 wherein said principal solvent is selected from the group consisting of:

1. 1,2-propanediol (C3) 2(Me-E₃₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₈₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,3-propanediol (C3) 2(Me-E₈); 1,3-propanediol (C3) PO₆; 1,3-propanediol, 2,2-diethyl- (C7) E₄₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₄₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₄₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₉₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₃₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₄₋₅); 1,3-propanediol, 2-methyl- (C4) PO₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₆₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₂₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₄₋₇; 1,3-propanediol, 2-methyl-2-propyl-

(C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂;

2. 1,2-butanediol (C4) (Me E₆₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₂₋₅; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₅₋₆); 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₆₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₄₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₃; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₃; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₃; 1,3-butanediol, 2-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₆₋₈; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₂₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₂₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₃₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₆₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₂₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₄₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂; 1,4-butanediol, 2-isopropyl- (C7) E₄₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₂; 1,4-butanediol, 2-methyl- (C5) (Me E₉₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-propyl- (C7) E₂₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₆₋₈; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₂₋₃; 2,3-butanediol

(C4) (Me E₉₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol, 2,3-dimethyl- (C6) E₇₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) BO₂₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₂₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₇₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 2-ethyl- (C7) E₆₋₈; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₃; 1,3-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 2-methyl- (C6) (Me-E₄₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₃; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₄₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,5-pentanediol, (C5) (Me-E₈₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₄₋₇;

1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 2-ethyl- (C7) E₂₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₄₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₄₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₂; 2,3-pentanediol, 3-methyl- (C6) E₄₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₂; 2,3-pentanediol, 4-methyl- (C6) E₄₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₂; 2,4-pentanediol, (C5) 2(Me-E₂₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₈₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₂₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₈₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₂₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₆₋₈; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 3-methyl- (C7) E₆₋₈; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 4-methyl- (C7) E₆₋₈; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,3-hexanediol, 5-methyl- (C7) E₆₋₈; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol (C6) (Me-E₂₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₆₋₈; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 3-methyl- (C7) E₆₋₈; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 4-methyl- (C7) E₆₋₈; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,4-hexanediol, 5-methyl- (C7) E₆₋₈; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol (C6) (Me-E₂₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₆₋₈; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 3-methyl- (C7) E₆₋₈; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₂₋₃; 1,5-

hexanediol, 4-methyl- (C7) E₆₋₈; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₂₋₃; 1,5-hexanediol, 5-methyl- (C7) E₆₋₈; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₂₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₂₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁; 1,6-hexanediol, 3-methyl- (C7) E₂₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁; 2,3-hexanediol (C6) E₂₋₅; 2,3-hexanediol (C6) n-BO₁; 2,4-hexanediol (C6) (Me-E₅₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₅₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₂₋₅; 3,4-hexanediol (C6) n-BO₁;

5. 1,3-heptanediol (C7) E₃₋₆; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₂; 1,4-heptanediol (C7) E₃₋₆; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₂; 1,5-heptanediol (C7) E₃₋₆; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₂; 1,6-heptanediol (C7) E₃₋₆; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₇₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₇₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₇₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₇₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-

hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof.

36. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; 1-phenyl-2,3-butanediol; and mixtures thereof.

37. The composition of Claim 36 wherein said principal solvent is selected from the group consisting of:

1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; and mixtures thereof.

38. The composition of Claim 37 wherein said principal solvent is selected from the group consisting of:

1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; and/or 1-phenyl-1,4-butanediol; and mixtures thereof.

39. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of: solvents are homologs, or analogs, of the parent compounds below where one, or more, CH₂ groups are added while, for each CH₂ group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen atoms in the molecule constant, the parent compounds including the following:

I. mono-ols including:

- a. n-propanol; and/or
- b. 2-butanol or 2-methyl-2-propanol;

II. hexane diol isomers including: 2,3-butanediol, 2,3-dimethyl-; 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol;

1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and/or 1,2-hexanediol;

III. heptane diol isomers including: 1,3-propanediol, 2-butyl-; 1,3-propanediol, 2,2-diethyl-; 1,3-propanediol, 2-(1-methylpropyl)-; 1,3-propanediol, 2-(2-methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; and/or 1,6-heptanediol;

IV. octane diol isomers including: 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 1,2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-

pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-

heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

V. nonane diol isomers including: 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VI. glyceryl ethers and/or di(hydroxyalkyl)ethers including: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amyl-1-oxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amyl-1-oxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; and/or 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated;

VII. saturated and unsaturated alicyclic diols and their derivatives including:

(a) the saturated diols and their derivatives, including:

1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-

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cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 2-hydroxymethylcyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-hydroxymethylcyclohexanol; 4-methyl-1,2-cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; ; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxylate; 1,2-cyclohexanediol, dibutylenoxylate; and/or 1,2-cyclohexanediol, tributyleneoxylate; and

(b). the unsaturated alicyclic diols including: 1,2-cyclobutanediol, 1-ethenyl-2-ethyl-; 3-cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-; 3-cyclobutene-1,2-diol, 3,4-diethyl-; 3-cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-; 3-cyclobutene-1,2-diol, 3-butyl-; 1,2-cyclopentenediol, 1,2-dimethyl-4-methylene-; 1,2-cyclopentenediol, 1-ethyl-3-methylene-; 1,2-cyclopentenediol, 4-(1-propenyl); 3-cyclopentene-1,2-diol, 1-ethyl-3-methyl-; 1,2-cyclohexanediol, 1-ethenyl-; 1,2-cyclohexanediol, 1-methyl-3-methylene-; 1,2-cyclohexanediol, 1-methyl-4-methylene-; 1,2-cyclohexanediol, 3-ethenyl-; 1,2-cyclohexanediol, 4-ethenyl-; 3-cyclohexene-1,2-diol, 2,6-dimethyl-; 3-cyclohexene-1,2-diol, 6,6-dimethyl-; 4-cyclohexene-1,2-diol, 3,6-dimethyl-; 4-cyclohexene-1,2-diol, 4,5-dimethyl-; 3-cyclooctene-1,2-diol; 4-cyclooctene-1,2-diol; and/or 5-cyclooctene-1,2-diol;

VIII. Alkoxylated derivatives of C₃₋₈ diols including:

1. 1,2-propanediol (C3) 2(Me-E₁₁₋₁₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol (C3) BO₁; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) n-BO₁₋₂; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me-E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-

propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl- (C5) BO₁; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₁₋₁₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO; 1,3-butanediol (C4) 2(Me E₁₁₋₁₄); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅;

1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂; 1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₁₋₁₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₁₋₆); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) 2PO₂; 2,3-butanediol, 2-methyl- (C5) n-BO₁; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 3-methyl (C6) BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) n-BO₁; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol,

3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) n-BO₁; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) n-BO₁; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₁₋₁₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₁₋₁₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₁₋₁₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₁₋₁₄); 2,4-

pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₁₋₁₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₁₋₁₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-

methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7) PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl-

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(C8) n-BO₁; 1,4-pentanediol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof;

IX. aromatic diols including: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; and/or 1-phenyl-2,3-butanediol; and

X. mixtures thereof.

40. The composition of any f Claims 11-15 wherein said principal solvent is selected from the group consisting of:

1,3-Propanediol, 2,2-di-2-propenyl-; 1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 1,2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-(3-methyl-

1-butenyl)-; 1,3-Propanediol, 2-(4-pentenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-; 1,3-Butanediol, 2,2-diallyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-Butanediol, 2-(2-butenyl)-2-methyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-Butanediol, 2,3-bis(1-methylethylidene)-; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-; 2-Butene-1,4-diol, 2-(1-methylpropyl)-; 2-Butene-1,4-diol, 2-butyl-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-; 1,5-Pentanediol, 2-(1-propenyl)-; 1,5-Pentanediol, 2-(2-propenyl)-; 1,5-Pentanediol, 2-ethylidene-3-methyl-; 1,5-Pentanediol, 2-propylidene-; 2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-Hexanediol, 4-ethyl-2-methylene-; 1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; 1,6-Hexanediol, 2-ethenyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-1,3-diol, 3-(2-propenyl)-; 5-Hexene-2,3-diol, 2,3-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,5-dimethyl-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 1,5-Heptadiene-3,4-diol, 2,3-dimethyl-; 1,5-Heptadiene-3,4-diol, 2,5-dimethyl-; 1,5-Heptadiene-3,4-diol, 3,5-dimethyl-; 1,7-Heptanediol, 2,6-bis(methylene)-; 1,7-Heptanediol, 4-methylene-; 1-Heptene-3,5-diol, 2,4-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 3-ethenyl-5-methyl-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 2,4-Heptadiene-2,6-diol, 4,6-dimethyl-; 2,5-Heptadiene-1,7-diol, 4,4-dimethyl-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,5-diol, 5-ethyl-; 2-Heptene-1,7-diol, 2-methyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 3-Heptene-1,7-diol, 3-methyl-6-methylene-; 3-Heptene-2,5-diol, 2,4-dimethyl-; 3-Heptene-2,5-diol, 2,5-dimethyl-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 3-Heptene-2,6-diol, 4,6-dimethyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 5-Heptene-1,3-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 5-Heptene-1,4-diol, 3,6-dimethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 6-Heptene-1,4-diol, 4-(2-propenyl)-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,5-diol, 2,4-dimethyl-; 6-Heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 6-Heptene-2,5-diol, 5-ethenyl-4-

methyl-; 1,3-Octanediol, 2-methylene-; 1,6-Octadiene-3,5-diol, 2,6-dimethyl-; 1,6-Octadiene-3,5-diol, 3,7-dimethyl-; 1,7-Octadiene-3,6-diol, 2,6-dimethyl-; 1,7-Octadiene-3,6-diol, 2,7-dimethyl-; 1,7-Octadiene-3,6-diol, 3,6-dimethyl-; 1-Octene-3,6-diol, 3-ethenyl-; 2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-; 2,4-Octadiene-1,7-diol, 3,7-dimethyl-; 2,5-Octadiene-1,7-diol, 2,6-dimethyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-Octadiene-1,8-diol, 2-methyl-; 2,7-Octadiene-1,4-diol, 3,7-dimethyl-; 2,7-Octadiene-1,5-diol, 2,6-dimethyl-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool); 2,7-Octadiene-1,6-diol, 2,7-dimethyl-; 2-Octene-1,4-diol; 2-Octene-1,7-diol; 2-Octene-1,7-diol, 2-methyl-6-methylene-; 3,5-Octadiene-1,7-diol, 3,7-dimethyl-; 3,5-Octadiene-2,7-diol, 2,7-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3-Octene-1,5-diol, 5-methyl-; 4,6-Octadiene-1,3-diol, 2,2-dimethyl-; 4,7-Octadiene-2,3-diol, 2,6-dimethyl-; 4,7-Octadiene-2,6-diol, 2,6-dimethyl-; 4-Octene-1,6-diol, 7-methyl-; 2,7-bis(methylene)-; 2-methylene-; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 5,7-Octadiene-1,4-diol, 7-methyl-; 5-Octene-1,3-diol; 6-Octene-1,3-diol, 7-methyl-; 6-Octene-1,4-diol, 7-methyl-; 6-Octene-1,5-diol; 6-Octene-1,5-diol, 7-methyl-; 6-Octene-3,5-diol, 2-methyl-; 6-Octene-3,5-diol, 4-methyl-; 7-Octene-1,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 7-Octene-1,3-diol, 7-methyl-; 7-Octene-1,5-diol; 7-Octene-1,6-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-2,4-diol, 2-methyl-6-methylene-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-3,5-diol, 2-methyl-; 1-Nonene-3,5-diol; 1-Nonene-3,7-diol; 3-Nonene-2,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 4-Nonene-2,8-diol; 6,8-Nonadiene-1,5-diol; 7-Nonene-2,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,5-diol; 1,9-Decadiene-3,8-diol; 1,9-Decadiene-4,6-diol; and mixtures thereof.

41. The composition of any of Claims 11-15 wherein said principal solvent is selected from the group consisting of:

1,3-Butanediol, 2,2-diallyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-Butanediol, 2-(2-butenyl)-2-methyl-; 1,3-Butanediol, 2-(3-methyl-2-butenyl)-; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-Butanediol, 2,3-bis(1-methylethylidene)-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-Hexanediol, 4-ethyl-2-methylene-; 1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; 2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 2,4-Heptadiene-2,6-diol, 4,6-dimethyl-; 2,6-

Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 5-Heptene-1,3-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 5-Heptene-1,4-diol, 3,6-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,5-diol, 2,4-dimethyl-; 6-Heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 1-Octene-3,6-diol, 3-ethenyl-; 2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-; 2,5-Octadiene-1,7-diol, 2,6-dimethyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-Octadiene-1,8-diol, 2-methyl-; 2,7-Octadiene-1,4-diol, 3,7-dimethyl-; 2,7-Octadiene-1,5-diol, 2,6-dimethyl-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool); 2,7-Octadiene-1,6-diol, 2,7-dimethyl-; 2-Octene-1,7-diol, 2-methyl-6-methylene-; 3,5-Octadiene-2,7-diol, 2,7-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 4-Octene-1,8-diol, 2-methylene-; 6-Octene-3,5-diol, 2-methyl-; 6-Octene-3,5-diol, 4-methyl-; 7-Octene-2,4-diol, 2-methyl-6-methylene-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-3,5-diol, 2-methyl-; 1-Nonene-3,5-diol; 1-Nonene-3,7-diol; 3-Nonene-2,5-diol; 4-Nonene-2,8-diol; 6,8-Nonadiene-1,5-diol; 7-Nonene-2,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,5-diol; 1,9-Decadiene-3,8-diol; 1,9-Decadiene-4,6-diol; and mixtures thereof.

42. The composition of any of Claims 11-15 wherein the softener active comprises up to about 20% of monoester compound in which m is 2 and one YR¹ is -OH, -N(R)H, or -C(O)OH.

43. The composition of any of Claims 11-15 wherein at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is from about 55:45 to about 85:15; at water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is from about 45:55 to about 70:30; and at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is from about 30:70 to about 55:45.

44. The composition of Claim 43 wherein at low water levels of from about 5% to about 15%, the softener active-to-principal solvent weight ratio is from about 60:40 to about 80:20; at water levels of from about 15% to about 70%, the softener active-to-principal solvent weight ratio is from about 55:45 to about 70:30; and at high water levels of from about 70% to about 80%, the softener active-to-principal solvent weight ratio is from about 35:65 to about 45:55.

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45. The composition of Claim 11 which is translucent or clear at 25°C, containing solvents other than principal solvent B., the amount of principal solvent B. being at least about 5% by weight of the composition, where the composition is not translucent or clear at 25°C in the absence of principal solvent B.

46. The composition of any of Claims 11-15 which contains one, or more, of the following optional ingredients:

- (a) brightener at a level of from about 0.005% to about 5%;
- (b) dispersibility aid at a level of from about 2% to about 25%;
- (c) soil release agent at a level of from 0% to about 10%;
- (d) scum dispersant at a level of from about 2% to about 10%;
- (e) stabilizer selected from the group consisting of antioxidant, reducing agent, chelator, and mixtures thereof, at a level of from 0% to about 2%;
- (f) bactericide at a level of from about 0.005% to about 5%; and
- (g) chelating agent in addition to any chelator in (e), at a level of from about 0.5% to about 10%.

47. A premix of the components of any of Claims 11-15 consisting essentially of: said biodegradable fabric softener active A.; said principal solvent B.; and optionally, said water soluble solvent C.

48. An article of manufacture comprising the composition of Claim 11 in a clear bottle.

49. The article of Claim 48 wherein the bottle has a slight blue tint, sufficient to compensate for any light yellow color of the composition.

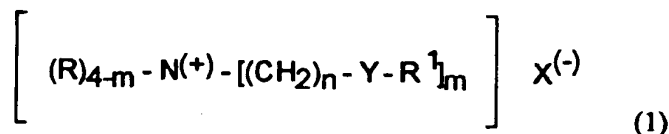
50. The article of Claim 49 wherein the bottle has an ultraviolet light absorber incorporated in the bottle wall to protect the composition.

51. Composition comprising:

A. from about 2% to about 80% of biodegradable fabric softener active selected from the group consisting of:

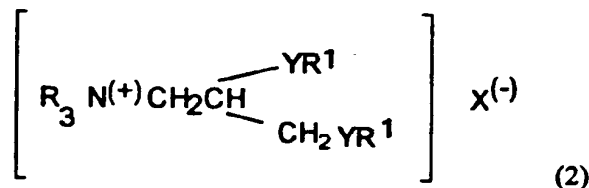
- 1. softener having the formula:

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wherein each R substituent is H, or a short chain C₁-C₆ alkyl or hydroxyalkyl group, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4; each Y is -O-(O)C-, -(R)N-(O)C-, -C(O)-N(R)-, or -C(O)-O-, the sum of carbons in each R¹ or YR¹ plus one when Y is -O-(O)C- or -(R)N-(O)C-, being C₆-C₂₂, but when one R¹ or YR¹ sum is less than about 12, then the other R¹ or YR¹ sum is at least about 16, with each R¹ being a long chain hydrocarbyl, or substituted hydrocarbyl substituent, and for R¹ or YR¹ comprising a C₁₅-C₂₁ straight chain alkyl or alkylene group, the Iodine Value of a fatty acid which contains this R¹ group being from about 20 to about 140, and wherein the counterion, X⁻, can be any softener-compatible anion;

2. softener having the formula:



wherein each Y, R, R¹, and X⁽⁻⁾ have the same meanings as before; and

3. mixtures thereof;

B. less than about 40% by weight of the composition of principal alcohol solvent selected from the group consisting of:

I. mono-ols including:

- a. n-propanol; and/or
- b. 2-butanol and/or 2-methyl-2-propanol;

II. hexane diol isomers including: 2,3-butanediol, 2,3-dimethyl-; 1,2-butanediol, 2,3-dimethyl-; 1,2-butanediol, 3,3-dimethyl-; 2,3-pentanediol, 2-methyl-; 2,3-pentanediol, 3-methyl-; 2,3-pentanediol, 4-methyl-; 2,3-hexanediol; 3,4-hexanediol; 1,2-butanediol, 2-ethyl-; 1,2-pentanediol, 2-methyl-; 1,2-pentanediol, 3-methyl-; 1,2-pentanediol, 4-methyl-; and/or 1,2-hexanediol;

III. heptane diol isomers including: 1,3-propanediol, 2-butyl-; 1,3-propanediol, 2,2-diethyl-; 1,3-propanediol, 2-(1-methylpropyl)-; 1,3-propanediol, 2-(2-methylpropyl)-; 1,3-propanediol, 2-methyl-2-propyl-; 1,2-butanediol, 2,3,3-trimethyl-; 1,4-butanediol, 2-ethyl-2-methyl-; 1,4-butanediol, 2-ethyl-3-methyl-; 1,4-butanediol, 2-propyl-; 1,4-butanediol, 2-isopropyl-; 1,5-pentanediol, 2,2-dimethyl-; 1,5-

pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2,4-dimethyl-; 1,5-pentanediol, 3,3-dimethyl-; 2,3-pentanediol, 2,3-dimethyl-; 2,3-pentanediol, 2,4-dimethyl-; 2,3-pentanediol, 3,4-dimethyl-; 2,3-pentanediol, 4,4-dimethyl-; 3,4-pentanediol, 2,3-dimethyl-; 1,5-pentanediol, 2-ethyl-; 1,6-hexanediol, 2-methyl-; 1,6-hexanediol, 3-methyl-; 2,3-hexanediol, 2-methyl-; 2,3-hexanediol, 3-methyl-; 2,3-hexanediol, 4-methyl-; 2,3-hexanediol, 5-methyl-; 3,4-hexanediol, 2-methyl-; 3,4-hexanediol, 3-methyl-; 1,3-heptanediol; 1,4-heptanediol; 1,5-heptanediol; and/or 1,6-heptanediol;

IV. octane diol isomers including: 1,3-propanediol, 2-(2-methylbutyl)-; 1,3-propanediol, 2-(1,1-dimethylpropyl)-; 1,3-propanediol, 2-(1,2-dimethylpropyl)-; 1,3-propanediol, 2-(1-ethylpropyl)-; 1,3-propanediol, 2-(1-methylbutyl)-; 1,3-propanediol, 2-(2,2-dimethylpropyl)-; 1,3-propanediol, 2-(3-methylbutyl)-; 1,3-propanediol, 2-butyl-2-methyl-; 1,3-propanediol, 2-ethyl-2-isopropyl-; 1,3-propanediol, 2-ethyl-2-propyl-; 1,3-propanediol, 2-methyl-2-(1-methylpropyl)-; 1,3-propanediol, 2-methyl-2-(2-methylpropyl)-; 1,3-propanediol, 2-tertiary-butyl-2-methyl-; 1,3-butanediol, 2,2-diethyl-; 1,3-butanediol, 2-(1-methylpropyl)-; 1,3-butanediol, 2-butyl-; 1,3-butanediol, 2-ethyl-2,3-dimethyl-; 1,3-butanediol, 2-(1,1-dimethylethyl)-; 1,3-butanediol, 2-(2-methylpropyl)-; 1,3-butanediol, 2-methyl-2-isopropyl-; 1,3-butanediol, 2-methyl-2-propyl-; 1,3-butanediol, 3-methyl-2-isopropyl-; 1,3-butanediol, 3-methyl-2-propyl-; 1,4-butanediol, 2,2-diethyl-; 1,4-butanediol, 2-methyl-2-propyl-; 1,4-butanediol, 2-(1-methylpropyl)-; 1,4-butanediol, 2-ethyl-2,3-dimethyl-; 1,4-butanediol, 2-ethyl-3,3-dimethyl-; 1,4-butanediol, 2-(1,1-dimethylethyl)-; 1,4-butanediol, 2-(2-methylpropyl)-; 1,4-butanediol, 2-methyl-3-propyl-; 1,4-butanediol, 3-methyl-2-isopropyl-; 1,3-pentanediol, 2,2,3-trimethyl-; 1,3-pentanediol, 2,2,4-trimethyl-; 1,3-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2,4,4-trimethyl-; 1,3-pentanediol, 3,4,4-trimethyl-; 1,4-pentanediol, 2,2,3-trimethyl-; 1,4-pentanediol, 2,2,4-trimethyl-; 1,4-pentanediol, 2,3,3-trimethyl-; 1,4-pentanediol, 2,3,4-trimethyl-; 1,4-pentanediol, 3,3,4-trimethyl-; 1,5-pentanediol, 2,2,3-trimethyl-; 1,5-pentanediol, 2,2,4-trimethyl-; 1,5-pentanediol, 2,3,3-trimethyl-; 1,5-pentanediol, 2,3,4-trimethyl-; 2,4-pentanediol, 2,3,3-trimethyl-; 2,4-pentanediol, 2,3,4-trimethyl-; 1,3-pentanediol, 2-ethyl-2-methyl-; 1,3-pentanediol, 2-ethyl-3-methyl-; 1,3-pentanediol, 2-ethyl-4-methyl-; 1,3-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-2-methyl-; 1,4-pentanediol, 2-ethyl-3-methyl-; 1,4-pentanediol, 2-ethyl-4-methyl-; 1,4-pentanediol, 3-ethyl-2-methyl-; 1,4-pentanediol, 3-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-2-methyl-; 1,5-pentanediol, 2-ethyl-3-methyl-; 1,5-pentanediol, 2-ethyl-4-methyl-; 1,5-pentanediol, 3-ethyl-3-methyl-; 2,4-pentanediol, 3-ethyl-2-methyl-; 1,3-pentanediol, 2-isopropyl-; 1,3-pentanediol, 2-propyl-; 1,4-pentanediol, 2-isopropyl-; 1,4-pentanediol, 2-propyl-; 1,4-pentanediol, 3-isopropyl-; 1,5-

pentanediol, 2-isopropyl-; 2,4-pentanediol, 3-propyl-; 1,3-hexanediol, 2,2-dimethyl-; 1,3-hexanediol, 2,3-dimethyl-; 1,3-hexanediol, 2,4-dimethyl-; 1,3-hexanediol, 2,5-dimethyl-; 1,3-hexanediol, 3,4-dimethyl-; 1,3-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 2,2-dimethyl-; 1,4-hexanediol, 2,3-dimethyl-; 1,4-hexanediol, 2,4-dimethyl-; 1,4-hexanediol, 2,5-dimethyl-; 1,4-hexanediol, 3,3-dimethyl-; 1,4-hexanediol, 3,4-dimethyl-; 1,4-hexanediol, 3,5-dimethyl-; 1,3-hexanediol, 4,4-dimethyl-; 1,4-hexanediol, 4,5-dimethyl-; 1,4-hexanediol, 5,5-dimethyl-; 1,5-hexanediol, 2,2-dimethyl-; 1,5-hexanediol, 2,3-dimethyl-; 1,5-hexanediol, 2,4-dimethyl-; 1,5-hexanediol, 2,5-dimethyl-; 1,5-hexanediol, 3,3-dimethyl-; 1,5-hexanediol, 3,4-dimethyl-; 1,5-hexanediol, 3,5-dimethyl-; 1,5-hexanediol, 4,5-dimethyl-; 1,6-hexanediol, 2,2-dimethyl-; 1,6-hexanediol, 2,3-dimethyl-; 1,6-hexanediol, 2,4-dimethyl-; 1,6-hexanediol, 2,5-dimethyl-; 1,6-hexanediol, 3,3-dimethyl-; 1,6-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 2,3-dimethyl-; 2,4-hexanediol, 2,4-dimethyl-; 2,4-hexanediol, 2,5-dimethyl-; 2,4-hexanediol, 3,3-dimethyl-; 2,4-hexanediol, 3,4-dimethyl-; 2,4-hexanediol, 3,5-dimethyl-; 2,4-hexanediol, 4,5-dimethyl-; 2,4-hexanediol, 5,5-dimethyl-; 2,5-hexanediol, 2,3-dimethyl-; 2,5-hexanediol, 2,4-dimethyl-; 2,5-hexanediol, 2,5-dimethyl-; 2,5-hexanediol, 3,3-dimethyl-; 2,5-hexanediol, 3,4-dimethyl-; 2,6-hexanediol, 3,3-dimethyl-; 1,3-hexanediol, 2-ethyl-; 1,3-hexanediol, 4-ethyl-; 1,4-hexanediol, 2-ethyl-; 1,4-hexanediol, 4-ethyl-; 1,5-hexanediol, 2-ethyl-; 2,4-hexanediol, 3-ethyl-; 2,4-hexanediol, 4-ethyl-; 2,5-hexanediol, 3-ethyl-; 1,3-heptanediol, 2-methyl-; 1,3-heptanediol, 3-methyl-; 1,3-heptanediol, 4-methyl-; 1,3-heptanediol, 5-methyl-; 1,3-heptanediol, 6-methyl-; 1,4-heptanediol, 2-methyl-; 1,4-heptanediol, 3-methyl-; 1,4-heptanediol, 4-methyl-; 1,4-heptanediol, 5-methyl-; 1,4-heptanediol, 6-methyl-; 1,5-heptanediol, 2-methyl-; 1,5-heptanediol, 3-methyl-; 1,5-heptanediol, 4-methyl-; 1,5-heptanediol, 5-methyl-; 1,5-heptanediol, 6-methyl-; 1,6-heptanediol, 2-methyl-; 1,6-heptanediol, 3-methyl-; 1,6-heptanediol, 4-methyl-; 1,6-heptanediol, 5-methyl-; 1,6-heptanediol, 6-methyl-; 2,4-heptanediol, 2-methyl-; 2,4-heptanediol, 3-methyl-; 2,4-heptanediol, 4-methyl-; 2,4-heptanediol, 5-methyl-; 2,4-heptanediol, 6-methyl-; 2,5-heptanediol, 2-methyl-; 2,5-heptanediol, 3-methyl-; 2,5-heptanediol, 4-methyl-; 2,5-heptanediol, 5-methyl-; 2,5-heptanediol, 6-methyl-; 2,6-heptanediol, 2-methyl-; 2,6-heptanediol, 3-methyl-; 2,6-heptanediol, 4-methyl-; 3,4-heptanediol, 3-methyl-; 3,5-heptanediol, 2-methyl-; 3,5-heptanediol, 3-methyl-; 3,5-heptanediol, 4-methyl-; 2,4-octanediol; 2,5-octanediol; 2,6-octanediol; 2,7-octanediol; 3,5-octanediol; and/or 3,6-octanediol;

V. nonane diol isomers including: 2,4-pentanediol, 2,3,3,4-tetramethyl-; 2,4-pentanediol, 3-tertiarybutyl-; 2,4-hexanediol, 2,5,5-trimethyl-; 2,4-hexanediol, 3,3,4-

trimethyl-; 2,4-hexanediol, 3,3,5-trimethyl-; 2,4-hexanediol, 3,5,5-trimethyl-; 2,4-hexanediol, 4,5,5-trimethyl-; 2,5-hexanediol, 3,3,4-trimethyl-; and/or 2,5-hexanediol, 3,3,5-trimethyl-;

VI. glyceryl ethers and/or di(hydroxyalkyl)ethers including: 1,2-propanediol, 3-(n-pentyloxy)-; 1,2-propanediol, 3-(2-pentyloxy)-; 1,2-propanediol, 3-(3-pentyloxy)-; 1,2-propanediol, 3-(2-methyl-1-butyloxy)-; 1,2-propanediol, 3-(iso-amylloxy)-; 1,2-propanediol, 3-(3-methyl-2-butyloxy)-; 1,2-propanediol, 3-(cyclohexyloxy)-; 1,2-propanediol, 3-(1-cyclohex-1-enyloxy)-; 1,3-propanediol, 2-(pentyloxy)-; 1,3-propanediol, 2-(2-pentyloxy)-; 1,3-propanediol, 2-(3-pentyloxy)-; 1,3-propanediol, 2-(2-methyl-1-butyloxy)-; 1,3-propanediol, 2-(iso-amylloxy)-; 1,3-propanediol, 2-(3-methyl-2-butyloxy)-; 1,3-propanediol, 2-(cyclohexyloxy)-; 1,3-propanediol, 2-(1-cyclohex-1-enyloxy)-; 1,2-propanediol, 3-(butyloxy)-, triethoxylated; 1,2-propanediol, 3-(butyloxy)-, tetraethoxylated; 1,2-propanediol, 3-(butyloxy)-, pentaethoxylated; 1,2-propanediol, 3-(butyloxy)-, hexaethoxylated; 1,2-propanediol, 3-(butyloxy)-, heptaethoxylated; 1,2-propanediol, 3-(butyloxy)-, octaethoxylated; 1,2-propanediol, 3-(butyloxy)-, nonaethoxylated; 1,2-propanediol, 3-(butyloxy)-, monopropoxylated; 1,2-propanediol, 3-(butyloxy)-, dibutyleneoxylated; 1,2-propanediol, 3-(butyloxy)-, tributyleneoxylated; 1,2-propanediol, 3-phenyloxy-; 1,2-propanediol, 3-benzyloxy-; 1,2-propanediol, 3-(2-phenylethyloxy)-; 1,2-propanediol, 3-(1-phenyl-2-propanyloxy)-; 1,3-propanediol, 2-phenyloxy-; 1,3-propanediol, 2-(m-cresyloxy)-; 1,3-propanediol, 2-(p-cresyloxy)-; 1,3-propanediol, -benzyloxy-; 1,3-propanediol, 2-(2-phenylethyloxy)-; 1,3-propanediol, 2-(1-phenylethyloxy)-; bis(2-hydroxybutyl)ether; and/or bis(2-hydroxycyclopentyl)ether

VII. saturated and unsaturated alicyclic diols and their derivatives including:

(a) the saturated diols and their derivatives, including:

1-isopropyl-1,2-cyclobutanediol; 3-ethyl-4-methyl-1,2-cyclobutanediol; 3-propyl-1,2-cyclobutanediol; 3-isopropyl-1,2-cyclobutanediol; 1-ethyl-1,2-cyclopentanediol; 1,2-dimethyl-1,2-cyclopentanediol; 1,4-dimethyl-1,2-cyclopentanediol; 2,4,5-trimethyl-1,3-cyclopentanediol; 3,3-dimethyl-1,2-cyclopentanediol; 3,4-dimethyl-1,2-cyclopentanediol; 3,5-dimethyl-1,2-cyclopentanediol; 3-ethyl-1,2-cyclopentanediol; 4,4-dimethyl-1,2-cyclopentanediol; 4-ethyl-1,2-cyclopentanediol; 1,1-bis(hydroxymethyl)cyclohexane; 1,2-bis(hydroxymethyl)cyclohexane; 1,2-dimethyl-1,3-cyclohexanediol; 1,3-bis(hydroxymethyl)cyclohexane; 1,3-dimethyl-1,3-cyclohexanediol; 1,6-dimethyl-1,3-cyclohexanediol; 1-hydroxy-cyclohexaneethanol; 1-hydroxy-cyclohexanemethanol; 1-ethyl-1,3-cyclohexanediol; 1-methyl-1,2-cyclohexanediol; 2,2-dimethyl-1,3-cyclohexanediol; 2,3-dimethyl-1,4-cyclohexanediol; 2,4-dimethyl-1,3-cyclohexanediol; 2,5-dimethyl-1,3-

cyclohexanediol; 2,6-dimethyl-1,4-cyclohexanediol; 2-ethyl-1,3-cyclohexanediol; 2-hydroxycyclohexaneethanol; 2-hydroxyethyl-1-cyclohexanol; 3-hydroxyethyl-1-cyclohexanol; 3-hydroxycyclohexaneethanol; 3-hydroxymethylcyclohexanol; 3-methyl-1,2-cyclohexanediol; 4,4-dimethyl-1,3-cyclohexanediol; 4,5-dimethyl-1,3-cyclohexanediol; 4,6-dimethyl-1,3-cyclohexanediol; 4-ethyl-1,3-cyclohexanediol; 4-hydroxyethyl-1-cyclohexanol; 4-methyl-1,2-cyclohexanediol; 5,5-dimethyl-1,3-cyclohexanediol; 5-ethyl-1,3-cyclohexanediol; 1,2-cycloheptanediol; 2-methyl-1,3-cycloheptanediol; 2-methyl-1,4-cycloheptanediol; 4-methyl-1,3-cycloheptanediol; 5-methyl-1,3-cycloheptanediol; 5-methyl-1,4-cycloheptanediol; 6-methyl-1,4-cycloheptanediol; ; 1,3-cyclooctanediol; 1,4-cyclooctanediol; 1,5-cyclooctanediol; 1,2-cyclohexanediol, diethoxylate; 1,2-cyclohexanediol, triethoxylate; 1,2-cyclohexanediol, tetraethoxylate; 1,2-cyclohexanediol, pentaethoxylate; 1,2-cyclohexanediol, hexaethoxylate; 1,2-cyclohexanediol, heptaethoxylate; 1,2-cyclohexanediol, octaethoxylate; 1,2-cyclohexanediol, nonaethoxylate; 1,2-cyclohexanediol, monopropoxylate; 1,2-cyclohexanediol, monobutylenoxylate; 1,2-cyclohexanediol, dibutylenoxylate; and/or 1,2-cyclohexanediol, tributylenoxylate; and (b) the unsaturated alicyclic diols including: 1,2-cyclobutanediol, 1-ethenyl-2-ethyl-; 3-cyclobutene-1,2-diol, 1,2,3,4-tetramethyl-; 3-cyclobutene-1,2-diol, 3,4-diethyl-; 3-cyclobutene-1,2-diol, 3-(1,1-dimethylethyl)-; 3-cyclobutene-1,2-diol, 3-butyl-; 1,2-cyclopentanediol, 1,2-dimethyl-4-methylene-; 1,2-cyclopentanediol, 1-ethyl-3-methylene-; 1,2-cyclopentanediol, 4-(1-propenyl)-; 3-cyclopentene-1,2-diol, 1-ethyl-3-methyl-; 1,2-cyclohexanediol, 1-ethenyl-; 1,2-cyclohexanediol, 1-methyl-3-methylene-; 1,2-cyclohexanediol, 1-methyl-4-methylene-; 1,2-cyclohexanediol, 3-ethenyl-; 1,2-cyclohexanediol, 4-ethenyl-; 3-cyclohexene-1,2-diol, 2,6-dimethyl-; 3-cyclohexene-1,2-diol, 6,6-dimethyl-; 4-cyclohexene-1,2-diol, 3,6-dimethyl-; 4-cyclohexene-1,2-diol, 4,5-dimethyl-; 3-cyclooctene-1,2-diol; 4-cyclooctene-1,2-diol; and/or 5-cyclooctene-1,2-diol;

VIII. Alkoxyated derivatives of C₃₋₈ diols including:

- 1,2-propanediol (C3) 2(Me-E₁₋₄); 1,2-propanediol (C3) PO₄; 1,2-propanediol, 2-methyl- (C4) (Me-E₄₋₁₀); 1,2-propanediol, 2-methyl- (C4) 2(Me-E₁); 1,2-propanediol, 2-methyl- (C4) PO₃; 1,2-propanediol, 2-methyl- (C4) BO₁; 1,3-propanediol (C3) 2(Me-E₆₋₈); 1,3-propanediol (C3) PO₅₋₆; 1,3-propanediol, 2,2-diethyl- (C7) E₁₋₇; 1,3-propanediol, 2,2-diethyl- (C7) PO₁; 1,3-propanediol, 2,2-diethyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2,2-dimethyl- (C5) 2(Me E₁₋₂); 1,3-propanediol, 2,2-dimethyl- (C5) PO₃₋₄; 1,3-propanediol, 2-(1-methylpropyl)- (C7) E₁₋₇; 1,3-propanediol, 2-(1-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(1-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-(2-methylpr pyl)- (C7) E₁₋₇; 1,3-

propanediol, 2-(2-methylpropyl)- (C7) PO₁; 1,3-propanediol, 2-(2-methylpropyl)- (C7) n-BO₁₋₂; 1,3-propanediol, 2-ethyl- (C5) (Me E₆₋₁₀); 1,3-propanediol, 2-ethyl- (C5) 2(Me E₁); 1,3-propanediol, 2-ethyl- (C5) PO₃; 1,3-propanediol, 2-ethyl-2-methyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-ethyl-2-methyl- (C6) PO₂; 1,3-propanediol, 2-ethyl-2-methyl- (C6) BO₁; 1,3-propanediol, 2-isopropyl- (C6) (Me E₁₋₆); 1,3-propanediol, 2-isopropyl- (C6) PO₂; 1,3-propanediol, 2-isopropyl- (C6) BO₁; 1,3-propanediol, 2-methyl- (C4) 2(Me E₂₋₅); 1,3-propanediol, 2-methyl- (C4) PO₄₋₅; 1,3-propanediol, 2-methyl- (C4) BO₂; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) E₂₋₉; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-isopropyl- (C7) n-BO₁₋₃; 1,3-propanediol, 2-methyl-2-propyl- (C7) E₁₋₇; 1,3-propanediol, 2-methyl-2-propyl- (C7) PO₁; 1,3-propanediol, 2-methyl-2-propyl- (C7) n-BO₁₋₂; 1,3-propanediol, 2-propyl- (C6) (Me E₁₋₄); 1,3-propanediol, 2-propyl- (C6) PO₂; 1,3-propanediol, 2-propyl- (C6) BO₁;

2. 1,2-butanediol (C4) (Me E₂₋₈); 1,2-butanediol (C4) PO₂₋₃; 1,2-butanediol (C4) BO₁; 1,2-butanediol, 2,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 2-ethyl- (C6) E₁₋₃; 1,2-butanediol, 2-ethyl- (C6) n-BO₁; 1,2-butanediol, 2-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 2-methyl- (C5) PO₁; 1,2-butanediol, 3,3-dimethyl- (C6) E₁₋₆; 1,2-butanediol, 3,3-dimethyl- (C6) n-BO₁₋₂; 1,2-butanediol, 3-methyl- (C5) (Me E₁₋₂); 1,2-butanediol, 3-methyl- (C5) PO₁; 1,3-butanediol (C4) 2(Me E₃₋₆); 1,3-butanediol (C4) PO₅; 1,3-butanediol (C4) BO₂; 1,3-butanediol, 2,2,3-trimethyl- (C7) (Me E₁₋₃); 1,3-butanediol, 2,2,3-trimethyl- (C7) PO₁₋₂; 1,3-butanediol, 2,2-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,2-dimethyl- (C6) PO₃; 1,3-butanediol, 2,3-dimethyl- (C6) (Me E₃₋₈); 1,3-butanediol, 2,3-dimethyl- (C6) PO₃; 1,3-butanediol, 2-ethyl- (C6) (Me E₁₋₆); 1,3-butanediol, 2-ethyl- (C6) PO₂₋₃; 1,3-butanediol, 2-ethyl- (C6) BO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-2-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-ethyl-3-methyl- (C7) (Me E₁); 1,3-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,3-butanediol, 2-ethyl-3-methyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-isopropyl- (C7) (Me E₁); 1,3-butanediol, 2-isopropyl- (C7) PO₁; 1,3-butanediol, 2-isopropyl- (C7) n-BO₂₋₄; 1,3-butanediol, 2-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 2-methyl- (C5) PO₄; 1,3-butanediol, 2-propyl- (C7) E₂₋₉; 1,3-butanediol, 2-propyl- (C7) PO₁; 1,3-butanediol, 2-propyl- (C7) n-BO₁₋₃; 1,3-butanediol, 3-methyl- (C5) 2(Me E₁₋₃); 1,3-butanediol, 3-methyl- (C5) PO₄; 1,4-butanediol (C4) 2(Me E₂₋₄); 1,4-butanediol (C4) PO₄₋₅; 1,4-butanediol (C4) BO₂; 1,4-butanediol, 2,2,3-trimethyl- (C7) E₂₋₉; 1,4-butanediol, 2,2,3-trimethyl- (C7) PO₁; 1,4-butanediol, 2,2,3-trimethyl- (C7) n-BO₁₋₃; 1,4-butanediol, 2,2-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,2-dimethyl- (C6) PO₂;

1,4-butanediol, 2,2-dimethyl- (C6) BO₁; 1,4-butanediol, 2,3-dimethyl- (C6) (Me E₁₋₆); 1,4-butanediol, 2,3-dimethyl- (C6) PO₂; 1,4-butanediol, 2,3-dimethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl- (C6) (Me E₁₋₄); 1,4-butanediol, 2-ethyl- (C6) PO₂; 1,4-butanediol, 2-ethyl- (C6) BO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-2-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-2-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-ethyl-3-methyl- (C7) E₁₋₇; 1,4-butanediol, 2-ethyl-3-methyl- (C7) PO₁; 1,4-butanediol, 2-ethyl-3-methyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-isopropyl- (C7) E₁₋₇; 1,4-butanediol, 2-isopropyl- (C7) PO₁; 1,4-butanediol, 2-isopropyl- (C7) n-BO₁₋₂; 1,4-butanediol, 2-methyl- (C5) (Me E₆₋₁₀); 1,4-butanediol, 2-methyl- (C5) 2(Me E₁); 1,4-butanediol, 2-methyl- (C5) PO₃; 1,4-butanediol, 2-methyl- (C5) BO₁; 1,4-butanediol, 2-propyl- (C7) E₁₋₅; 1,4-butanediol, 2-propyl- (C7) n-BO₁₋₂; 1,4-butanediol, 3-ethyl-1-methyl- (C7) E₂₋₉; 1,4-butanediol, 3-ethyl-1-methyl- (C7) PO₁; 1,4-butanediol, 3-ethyl-1-methyl- (C7) n-BO₁₋₃; 2,3-butanediol (C4) (Me E₆₋₁₀); 2,3-butanediol (C4) 2(Me E₁); 2,3-butanediol (C4) PO₃₋₄; 2,3-butanediol (C4) BO₁; 2,3-butanediol, 2,3-dimethyl- (C6) E₃₋₉; 2,3-butanediol, 2,3-dimethyl- (C6) PO₁; 2,3-butanediol, 2,3-dimethyl- (C6) n-BO₁₋₃; 2,3-butanediol, 2-methyl- (C5) (Me E₁₋₅); 2,3-butanediol, 2-methyl- (C5) PO₂; 2,3-butanediol, 2-methyl- (C5) BO₁;

3. 1,2-pentanediol (C5) E₃₋₁₀; 1,2-pentanediol, (C5) PO₁; 1,2-pentanediol, (C5) n-BO₂₋₃; 1,2-pentanediol, 2-methyl (C6) E₁₋₃; 1,2-pentanediol, 2-methyl (C6) n-BO₁; 1,2-pentanediol, 2-methyl (C6) BO₁; 1,2-pentanediol, 3-methyl (C6) E₁₋₃; 1,2-pentanediol, 3-methyl (C6) n-BO₁; 1,2-pentanediol, 4-methyl (C6) E₁₋₃; 1,2-pentanediol, 4-methyl (C6) n-BO₁; 1,3-pentanediol (C5) 2(Me-E₁₋₂); 1,3-pentanediol (C5) PO₃₋₄; 1,3-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 2-ethyl- (C7) E₂₋₉; 1,3-pentanediol, 2-ethyl- (C7) PO₁; 1,3-pentanediol, 2-ethyl- (C7) n-BO₁₋₃; 1,3-pentanediol, 2-methyl- (C6) 2(Me-E₁₋₆); 1,3-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 2-methyl- (C6) BO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 3-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,3-pentanediol, 3-methyl- (C6) BO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) (Me-E₁); 1,3-pentanediol, 4,4-dimethyl- (C7) PO₁; 1,3-pentanediol, 4,4-dimethyl- (C7) n-BO₂₋₄; 1,3-pentanediol, 4-methyl- (C6) (Me-E₁₋₆); 1,3-pentanediol, 4-methyl- (C6) PO₂₋₃;

1,3-pentanediol, 4-methyl- (C6) BO₁; 1,4-pentanediol, (C5) 2(Me-E₁₋₂); 1,4-pentanediol (C5) PO₃₋₄; 1,4-pentanediol, 2,2-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,2-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 2,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 2-methyl- (C6) (Me-E₁₋₆); 1,4-pentanediol, 2-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 2-methyl- (C6) BO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,3-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3,4-dimethyl- (C7) (Me-E₁); 1,4-pentanediol, 3,4-dimethyl- (C7) PO₁; 1,4-pentanediol, 3,4-dimethyl- (C7) n-BO₂₋₄; 1,4-pentanediol, 3-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 3-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 3-methyl- (C6) BO₁; 1,4-pentanediol, 4-methyl- (C6) 2(Me-E₁₋₆); 1,4-pentanediol, 4-methyl- (C6) PO₂₋₃; 1,4-pentanediol, 4-methyl- (C6) BO₁; 1,5-pentanediol, (C5) (Me-E₄₋₁₀); 1,5-pentanediol (C5) 2(Me-E₁); 1,5-pentanediol (C5) PO₃; 1,5-pentanediol, 2,2-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,2-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,2-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2,4-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 2,4-dimethyl- (C7) PO₁; 1,5-pentanediol, 2,4-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-ethyl- (C7) E₁₋₅; 1,5-pentanediol, 2-ethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 2-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 2-methyl- (C6) PO₂; 1,5-pentanediol, 3,3-dimethyl- (C7) E₁₋₇; 1,5-pentanediol, 3,3-dimethyl- (C7) PO₁; 1,5-pentanediol, 3,3-dimethyl- (C7) n-BO₁₋₂; 1,5-pentanediol, 3-methyl- (C6) (Me-E₁₋₄); 1,5-pentanediol, 3-methyl- (C6) PO₂; 2,3-pentanediol, (C5) (Me-E₁₋₃); 2,3-pentanediol, (C5) PO₂; 2,3-pentanediol, 2-methyl- (C6) E₁₋₇; 2,3-pentanediol, 2-methyl- (C6) PO₁; 2,3-pentanediol, 2-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 3-methyl- (C6) E₁₋₇; 2,3-pentanediol, 3-methyl- (C6) PO₁; 2,3-pentanediol, 3-methyl- (C6) n-BO₁₋₂; 2,3-pentanediol, 4-methyl- (C6) E₁₋₇; 2,3-pentanediol, 4-methyl- (C6) PO₁; 2,3-pentanediol, 4-methyl- (C6) n-BO₁₋₂; 2,4-pentanediol, (C5) 2(Me-E₁₋₄); 2,4-pentanediol (C5) PO₄; 2,4-pentanediol, 2,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 2,4-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 2,4-dimethyl- (C7) PO₂; 2,4-pentanediol, 2-methyl- (C7) (Me-E₅₋₁₀); 2,4-pentanediol, 2-methyl- (C7) PO₃; 2,4-pentanediol, 3,3-dimethyl- (C7) (Me-E₁₋₄); 2,4-pentanediol, 3,3-dimethyl- (C7) PO₂; 2,4-pentanediol, 3-methyl- (C6) (Me-E₅₋₁₀); 2,4-pentanediol, 3-methyl- (C6) PO₃;

4. 1,3-hexanediol (C6) (Me-E₁₋₅); 1,3-hexanediol (C6) PO₂; 1,3-hexanediol (C6) BO₁; 1,3-hexanediol, 2-methyl- (C7) E₂₋₉; 1,3-hexanediol, 2-methyl- (C7) PO₁; 1,3-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 2-methyl- (C7) BO₁; 1,3-hexanediol, 3-methyl- (C7) E₂₋₉; 1,3-hexanediol, 3-methyl- (C7) PO₁; 1,3-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 4-methyl- (C7) E₂₋₉; 1,3-hexanediol, 4-methyl- (C7) PO₁; 1,3-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,3-hexanediol, 5-methyl- (C7) E₂₋₉; 1,3-hexanediol, 5-methyl- (C7) PO₁; 1,3-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol (C6) (Me-E₁₋₅); 1,4-hexanediol (C6) PO₂; 1,4-hexanediol (C6) BO₁; 1,4-hexanediol, 2-methyl- (C7) E₂₋₉; 1,4-hexanediol, 2-methyl- (C7) PO₁; 1,4-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 3-methyl- (C7) E₂₋₉; 1,4-hexanediol, 3-methyl- (C7) PO₁; 1,4-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 4-methyl- (C7) E₂₋₉; 1,4-hexanediol, 4-methyl- (C7) PO₁; 1,4-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,4-hexanediol, 5-methyl- (C7) E₂₋₉; 1,4-hexanediol, 5-methyl- (C7) PO₁; 1,4-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol (C6) (Me-E₁₋₅); 1,5-hexanediol (C6) PO₂; 1,5-hexanediol (C6) BO₁; 1,5-hexanediol, 2-methyl- (C7) E₂₋₉; 1,5-hexanediol, 2-methyl- (C7) PO₁; 1,5-hexanediol, 2-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 3-methyl- (C7) E₂₋₉; 1,5-hexanediol, 3-methyl- (C7) PO₁; 1,5-hexanediol, 3-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 4-methyl- (C7) E₂₋₉; 1,5-hexanediol, 4-methyl- (C7) PO₁; 1,5-hexanediol, 4-methyl- (C7) n-BO₁₋₃; 1,5-hexanediol, 5-methyl- (C7) E₂₋₉; 1,5-hexanediol, 5-methyl- (C7) PO₁; 1,5-hexanediol, 5-methyl- (C7) n-BO₁₋₃; 1,6-hexanediol (C6) (Me-E₁₋₂); 1,6-hexanediol (C6) PO₁₋₂; 1,6-hexanediol (C6) n-BO₄; 1,6-hexanediol, 2-methyl- (C7) E₁₋₅; 1,6-hexanediol, 2-methyl- (C7) n-BO₁₋₂; 1,6-hexanediol, 3-methyl- (C7) E₁₋₅; 1,6-hexanediol, 3-methyl- (C7) n-BO₁₋₂; 2,3-hexanediol (C6) E₁₋₅; 2,3-hexanediol (C6) n-BO₁; 2,3-hexanediol (C6) BO₁; 2,4-hexanediol (C6) (Me-E₃₋₈); 2,4-hexanediol (C6) PO₃; 2,4-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 2-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 3-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 4-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 4-methyl- (C7) PO₁₋₂; 2,4-hexanediol, 5-methyl- (C7) (Me-E₁₋₂); 2,4-hexanediol 5-methyl- (C7) PO₁₋₂; 2,5-hexanediol (C6) (Me-E₃₋₈); 2,5-hexanediol (C6) PO₃; 2,5-hexanediol, 2-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 2-methyl- (C7) PO₁₋₂; 2,5-hexanediol, 3-methyl- (C7) (Me-E₁₋₂); 2,5-hexanediol 3-methyl- (C7) PO₁₋₂; 3,4-hexanediol (C6) EO₁₋₅; 3,4-hexanediol (C6) n-BO₁; 3,4-hexanediol (C6) BO₁;

5. 1,3-heptanediol (C7) E₁₋₇; 1,3-heptanediol (C7) PO₁; 1,3-heptanediol (C7) n-BO₁₋₂; 1,4-heptanediol (C7) E₁₋₇; 1,4-heptanediol (C7) PO₁; 1,4-heptanediol (C7) n-BO₁₋₂; 1,5-heptanediol (C7) E₁₋₇; 1,5-heptanediol (C7)

PO₁; 1,5-heptanediol (C7) n-BO₁₋₂; 1,6-heptanediol (C7) E₁₋₇; 1,6-heptanediol (C7) PO₁; 1,6-heptanediol (C7) n-BO₁₋₂; 1,7-heptanediol (C7) E₁₋₂; 1,7-heptanediol (C7) n-BO₁; 2,4-heptanediol (C7) E₃₋₁₀; 2,4-heptanediol (C7) (Me-E₁); 2,4-heptanediol (C7) PO₁; 2,4-heptanediol (C7) n-BO₃; 2,5-heptanediol (C7) E₃₋₁₀; 2,5-heptanediol (C7) (Me-E₁); 2,5-heptanediol (C7) PO₁; 2,5-heptanediol (C7) n-BO₃; 2,6-heptanediol (C7) E₃₋₁₀; 2,6-heptanediol (C7) (Me-E₁); 2,6-heptanediol (C7) PO₁; 2,6-heptanediol (C7) n-BO₃; 3,5-heptanediol (C7) E₃₋₁₀; 3,5-heptanediol (C7) (Me-E₁); 3,5-heptanediol (C7) PO₁; 3,5-heptanediol (C7) n-BO₃;

6. 1,3-butanediol, 3-methyl-2-isopropyl- (C8) PO₁; 2,4-pentanediol, 2,3,3-trimethyl- (C8) PO₁; 1,3-butanediol, 2,2-diethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 3,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 4,5-dimethyl- (C8) E₂₋₅; 2,4-hexanediol, 5,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,4-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 2,5-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,3-dimethyl- (C8) E₂₋₅; 2,5-hexanediol, 3,4-dimethyl- (C8) E₂₋₅; 3,5-heptanediol, 3-methyl- (C8) E₂₋₅; 1,3-butanediol, 2,2-diethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 3,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 4,5-dimethyl- (C8) n-BO₁₋₂; 2,4-hexanediol, 5,5-dimethyl-, n-BO₁₋₂; 2,5-hexanediol, 2,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,4-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 2,5-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,3-dimethyl- (C8) n-BO₁₋₂; 2,5-hexanediol, 3,4-dimethyl- (C8) n-BO₁₋₂; 3,5-heptanediol, 3-methyl- (C8) n-BO₁₋₂; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) n-BO₁; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) n-BO₁; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) n-BO₁; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 2,4,4-trimethyl- (C8) n-BO₁; 1,3-pentanediol, 3,4,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,2,4-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,3-trimethyl- (C8) n-BO₁; 1,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 1,4-pentane diol, 3,3,4-trimethyl- (C8) n-BO₁; 2,4-pentanediol, 2,3,4-trimethyl- (C8) n-BO₁; 2,4-hexanediol, 4-ethyl- (C8) n-BO₁; 2,4-heptanediol, 2-methyl- (C8) n-BO₁; 2,4-heptanediol, 3-methyl- (C8) n-BO₁; 2,4-heptanediol, 4-methyl- (C8) n-BO₁; 2,4-heptanediol, 5-methyl- (C8) n-BO₁; 2,4-heptanediol, 6-methyl- (C8) n-BO₁; 2,5-heptanediol, 2-methyl- (C8) n-BO₁; 2,5-heptanediol, 3-

methyl- (C8) n-BO₁; 2,5-heptanediol, 4-methyl- (C8) n-BO₁; 2,5-heptanediol, 5-methyl- (C8) n-BO₁; 2,5-heptanediol, 6-methyl- (C8) n-BO₁; 2,6-heptanediol, 2-methyl- (C8) n-BO₁; 2,6-heptanediol, 3-methyl- (C8) n-BO₁; 2,6-heptanediol, 4-methyl- (C8) n-BO₁; 3,5-heptanediol, 2-methyl- (C8) n-BO₁; 1,3-propanediol, 2-(1,2-dimethylpropyl)- (C8) E₁₋₃; 1,3-butanediol, 2-ethyl-2,3-dimethyl- (C8) E₁₋₃; 1,3-butanediol, 2-methyl-2-isopropyl- (C8) E₁₋₃; 1,4-butanediol, 3-methyl-2-isopropyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 2,4,4-trimethyl- (C8) E₁₋₃; 1,3-pentanediol, 3,4,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,2,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,3-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 1,4-pentanediol, 3,3,4-trimethyl- (C8) E₁₋₃; 2,4-pentanediol, 2,3,4-trimethyl- (C8) E₁₋₃; 2,4-hexanediol, 4-ethyl- (C8) E₁₋₃; 2,4-heptanediol, 2-methyl- (C8) E₁₋₃; 2,4-heptanediol, 3-methyl- (C8) E₁₋₃; 2,4-heptanediol, 4-methyl- (C8) E₁₋₃; 2,4-heptanediol, 5-methyl- (C8) E₁₋₃; 2,4-heptanediol, 6-methyl- (C8) E₁₋₃; 2,5-heptanediol, 2-methyl- (C8) E₁₋₃; 2,5-heptanediol, 3-methyl- (C8) E₁₋₃; 2,5-heptanediol, 4-methyl- (C8) E₁₋₃; 2,5-heptanediol, 5-methyl- (C8) E₁₋₃; 2,5-heptanediol, 6-methyl- (C8) E₁₋₃; 2,6-heptanediol, 2-methyl- (C8) E₁₋₃; 2,6-heptanediol, 3-methyl- (C8) E₁₋₃; 2,6-heptanediol, 4-methyl- (C8) E₁₋₃; and/or 3,5-heptanediol, 2-methyl- (C8) E₁₋₃; and

7. mixtures thereof,

IX. aromatic diols including: 1-phenyl-1,2-ethanediol; 1-phenyl-1,2-propanediol; 2-phenyl-1,2-propanediol; 3-phenyl-1,2-propanediol; 1-(3-methylphenyl)-1,3-propanediol; 1-(4-methylphenyl)-1,3-propanediol; 2-methyl-1-phenyl-1,3-propanediol; 1-phenyl-1,3-butanediol; 3-phenyl-1,3-butanediol; 1-phenyl-1,4-butanediol; 2-phenyl-1,4-butanediol; and/or 1-phenyl-2,3-butanediol;

X. solvents which have a ClogP value of from about 0.15 to about 0.64 and are homologs, or analogs, of the above structures where one, or more, CH₂ groups are added while, for each CH₂ group added, two hydrogen atoms are removed from adjacent carbon atoms in the molecule to form one carbon-carbon double bond, thus holding the number of hydrogen atoms in the molecule constant, including the following:

1,3-Propanediol, 2,2-di-2-propenyl-; 1,3-Propanediol, 2-(1-pentenyl)-; 1,3-Propanediol, 2-(2-methyl-2-propenyl)-2-(2-propenyl)-; 1,3-Propanediol, 2-(3-methyl-1-butenyl)-; 1,3-Propanediol, 2-(4-pentenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-methyl-2-propenyl)-; 1,3-Propanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Propanediol, 2-methyl-2-(3-methyl-3-butenyl)-; 1,3-Butanediol, 2,2-diallyl-; 1,3-Butanediol, 2-(1-ethyl-1-propenyl)-; 1,3-Butanediol, 2-(2-butenyl)-2-methyl-; 1,3-Butanediol, 2-(3-methyl-2-

butenyl)-; 1,3-Butanediol, 2-ethyl-2-(2-propenyl)-; 1,3-Butanediol, 2-methyl-2-(1-methyl-2-propenyl)-; 1,4-Butanediol, 2,3-bis(1-methylethylidene)-; 1,4-Butanediol, 2-(3-methyl-2-butenyl)-3-methylene-; 2-Butene-1,4-diol, 2-(1,1-dimethylpropyl)-; 2-Butene-1,4-diol, 2-(1-methylpropyl)-; 2-Butene-1,4-diol, 2-butyl-; 1,3-Pentanediol, 2-ethenyl-3-ethyl-; 1,3-Pentanediol, 2-ethenyl-4,4-dimethyl-; 1,4-Pentanediol, 3-methyl-2-(2-propenyl)-; 1,5-Pentanediol, 2-(1-propenyl)-; 1,5-Pentanediol, 2-(2-propenyl)-; 1,5-Pentanediol, 2-ethylidene-3-methyl-; 1,5-Pentanediol, 2-propylidene-; 2,4-Pentanediol, 3-ethylidene-2,4-dimethyl-; 4-Pentene-1,3-diol, 2-(1,1-dimethylethyl)-; 4-Pentene-1,3-diol, 2-ethyl-2,3-dimethyl-; 1,4-Hexanediol, 4-ethyl-2-methylene-; 1,5-Hexadiene-3,4-diol, 2,3,5-trimethyl-; 1,5-Hexadiene-3,4-diol, 5-ethyl-3-methyl-; 1,5-Hexanediol, 2-(1-methylethenyl)-; 1,6-Hexanediol, 2-ethenyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 1-Hexene-3,4-diol, 5,5-dimethyl-; 2-Hexene-1,5-diol, 4-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethenyl-2,5-dimethyl-; 3-Hexene-1,6-diol, 2-ethyl-; 3-Hexene-1,6-diol, 3,4-dimethyl-; 4-Hexene-2,3-diol, 2,5-dimethyl-; 4-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-1,3-diol, 3-(2-propenyl)-; 5-Hexene-2,3-diol, 2,3-dimethyl-; 5-Hexene-2,3-diol, 3,4-dimethyl-; 5-Hexene-2,3-diol, 3,5-dimethyl-; 5-Hexene-2,4-diol, 3-ethenyl-2,5-dimethyl-; 1,4-Heptanediol, 6-methyl-5-methylene-; 1,5-Heptadiene-3,4-diol, 2,3-dimethyl-; 1,5-Heptadiene-3,4-diol, 2,5-dimethyl-; 1,5-Heptadiene-3,4-diol, 3,5-dimethyl-; 1,7-Heptanediol, 2,6-bis(methylene)-; 1,7-Heptanediol, 4-methylene-; 1-Heptene-3,5-diol, 2,4-dimethyl-; 1-Heptene-3,5-diol, 2,6-dimethyl-; 1-Heptene-3,5-diol, 3-ethenyl-5-methyl-; 1-Heptene-3,5-diol, 6,6-dimethyl-; 2,4-Heptadiene-2,6-diol, 4,6-dimethyl-; 2,5-Heptadiene-1,7-diol, 4,4-dimethyl-; 2,6-Heptadiene-1,4-diol, 2,5,5-trimethyl-; 2-Heptene-1,4-diol, 5,6-dimethyl-; 2-Heptene-1,5-diol, 5-ethyl-; 2-Heptene-1,7-diol, 2-methyl-; 3-Heptene-1,5-diol, 4,6-dimethyl-; 3-Heptene-1,7-diol, 3-methyl-6-methylene-; 3-Heptene-2,5-diol, 2,4-dimethyl-; 3-Heptene-2,5-diol, 2,5-dimethyl-; 3-Heptene-2,6-diol, 2,6-dimethyl-; 3-Heptene-2,6-diol, 4,6-dimethyl-; 5-Heptene-1,3-diol, 2,4-dimethyl-; 5-Heptene-1,3-diol, 3,6-dimethyl-; 5-Heptene-1,4-diol, 2,6-dimethyl-; 5-Heptene-1,4-diol, 3,6-dimethyl-; 5-Heptene-2,4-diol, 2,3-dimethyl-; 6-Heptene-1,3-diol, 2,2-dimethyl-; 6-Heptene-1,4-diol, 4-(2-propenyl)-; 6-Heptene-1,4-diol, 5,6-dimethyl-; 6-Heptene-1,5-diol, 2,4-dimethyl-; 6-Heptene-1,5-diol, 2-ethylidene-6-methyl-; 6-Heptene-2,4-diol, 4-(2-propenyl)-; 6-Heptene-2,4-diol, 5,5-dimethyl-; 6-Heptene-2,5-diol, 4,6-dimethyl-; 6-Heptene-2,5-diol, 5-ethenyl-4-methyl-; 1,3-Octanediol, 2-methylene-; 1,6-Octadiene-3,5-diol, 2,6-dimethyl-; 1,6-Octadiene-3,5-diol, 3,7-dimethyl-; 1,7-Octadiene-3,6-diol, 2,6-dimethyl-; 1,7-Octadiene-3,6-diol, 2,7-dimethyl-; 1,7-Octadiene-3,6-diol, 3,6-dimethyl-; 1-Octene-3,6-diol, 3-ethenyl-; 2,4,6-Octatriene-1,8-diol, 2,7-dimethyl-; 2,4-Octadiene-1,7-diol,

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3,7-dimethyl-; 2,5-Octadiene-1,7-diol, 2,6-dimethyl-; 2,5-Octadiene-1,7-diol, 3,7-dimethyl-; 2,6-Octadiene-1,4-diol, 3,7-dimethyl- (Rosiridol); 2,6-Octadiene-1,8-diol, 2-methyl-; 2,7-Octadiene-1,4-diol, 3,7-dimethyl-; 2,7-Octadiene-1,5-diol, 2,6-dimethyl-; 2,7-Octadiene-1,6-diol, 2,6-dimethyl- (8-Hydroxylinalool); 2,7-Octadiene-1,6-diol, 2,7-dimethyl-; 2-Octene-1,4-diol; 2-Octene-1,7-diol; 2-Octene-1,7-diol, 2-methyl-6-methylene-; 3,5-Octadiene-1,7-diol, 3,7-dimethyl-; 3,5-Octadiene-2,7-diol, 2,7-dimethyl-; 3,5-Octanediol, 4-methylene-; 3,7-Octadiene-1,6-diol, 2,6-dimethyl-; 3,7-Octadiene-2,5-diol, 2,7-dimethyl-; 3,7-Octadiene-2,6-diol, 2,6-dimethyl-; 3-Octene-1,5-diol, 4-methyl-; 3-Octene-1,5-diol, 5-methyl-; 4,6-Octadiene-1,3-diol, 2,2-dimethyl-; 4,7-Octadiene-2,3-diol, 2,6-dimethyl-; 4,7-Octadiene-2,6-diol, 2,6-dimethyl-; 4-Octene-1,6-diol, 7-methyl-; 2,7-bis(methylene)-; 2-methylene-; 5,7-Octadiene-1,4-diol, 2,7-dimethyl-; 5,7-Octadiene-1,4-diol, 7-methyl-; 5-Octene-1,3-diol; 6-Octene-1,3-diol, 7-methyl-; 6-Octene-1,4-diol, 7-methyl-; 6-Octene-1,5-diol; 6-Octene-1,5-diol, 7-methyl-; 6-Octene-3,5-diol, 2-methyl-; 6-Octene-3,5-diol, 4-methyl-; 7-Octene-1,3-diol, 2-methyl-; 7-Octene-1,3-diol, 4-methyl-; 7-Octene-1,3-diol, 7-methyl-; 7-Octene-1,5-diol; 7-Octene-1,6-diol; 7-Octene-1,6-diol, 5-methyl-; 7-Octene-2,4-diol, 2-methyl-6-methylene-; 7-Octene-2,5-diol, 7-methyl-; 7-Octene-3,5-diol, 2-methyl-; 1-Nonene-3,5-diol; 1-Nonene-3,7-diol; 3-Nonene-2,5-diol; 4,6-Nonadiene-1,3-diol, 8-methyl-; 4-Nonene-2,8-diol; 6,8-Nonadiene-1,5-diol; 7-Nonene-2,4-diol; 8-Nonene-2,4-diol; 8-Nonene-2,5-diol; 1,9-Decadiene-3,8-diol; and/or 1,9-Decadiene-4,6-diol; and

XI. mixtures thereof, said principal solvent containing insufficient amounts of solvents selected from the group consisting of: 2,2,4-trimethyl-1,3-pentane diol; the ethoxylate, diethoxylate, or triethoxylate derivatives of 2,2,4-trimethyl-1,3-pentane diol; and/or 2-ethylhexyl-1,3-diol, to provide an aqueous stable product;

C. optionally, but preferably, an effective amount, sufficient to improve clarity, of low molecular weight water soluble solvents like ethanol, isopropanol, propylene glycol, 1,3-propanediol, propylene carbonate, etc., said water soluble solvents being at a level that will not form clear compositions by themselves;

D. optionally, but preferably, an effective amount to improve clarity, of water soluble calcium and/or magnesium salt, preferably chloride; and

E. the balance being water.

52. A composition according to Claim 51 wherein said principal solvent B. is present at an effective amount, but less than the amount required to achieve stability and the composition is made stable by addition of another solvent that is itself inoperable to achieve stability.

53. The process of making a clear fabric softening composition using the premix of Claim 47 and adding said premix to a water seat comprising water; acid to create a pH of from about 1.5 to about 5; and, optionally, an effective amount of water soluble calcium and/or magnesium salt.

54. The process of making a solvent mixture of Claim 6 comprising the condensation of butyraldehyde, isobutyraldehyde and/or methyl ethyl ketone (2-butanone), so long as the level of butyraldehyde, or isobutyraldehyde is less than about 95% of the reaction mixture, in the presence of highly alkaline catalyst followed by conversion by hydrogenation.

55. The process of Claim 54 wherein the level of butyraldehyde, or isobutyraldehyde is less than about 85% of the reaction mixture.

56. The process of Claim 54 wherein the level of butyraldehyde, or isobutyraldehyde is less than about 80% of the reaction mixture.

57. The mixture prepared by the process of Claim 54.

